

HP Instant Capacity User's Guide for versions 8.x

Second Edition



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United States

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B.11.11.08.00.01 on HP-UX 11i v1, and version 8.0 on OpenVMS 8.3
Integrity, available on web and Instant Information media)

IMPORTANT

New information may have been developed after the time of this edition. For the most current information, visit the following HP documentation web site (search for “Instant Capacity” + “User’s Guide” + “versions 8.x”):

<http://docs.hp.com>

Conventions in this Guide

This guide uses these typographic conventions:

Boldface	Words defined for the first time appear in boldface .
Computer	Computer font indicates system commands, file names, and literal items — which may be displayed by the computer. For example:
	file not found
User input	Bold, computer text indicates literal items that you type. For example, to change to your HP-UX account's home directory, enter:
	cd
<i>Italics</i>	Manual titles, variable in commands and emphasized words appear in <i>italics</i> . For example, you would substitute an actual directory name for <i>directory_name</i> in this command:
	cd <i>directory_name</i>
[] and	Brackets [] enclose optional items in command syntax. The vertical bar separates syntax items in a list of choices. For example, you can enter any of these three items in this syntax:
	ls [-a -i -x]
Enter	Text in this bold, sans-serif font denotes keyboard keys and on-screen menu items. A notation like Ctrl-Q indicates that you should hold the Ctrl key down and press Q .

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About this guide

This chapter covers the following topics:

- “Introduction” on page 12
- “Overview” on page 17
- “Instant Capacity Information” on page 23

For more in-depth information, see the HP-UX manpage *icap* (5).

Introduction

Welcome

Welcome to the *HP Instant Capacity User's Guide for versions 8.x*. Hewlett-Packard's Instant Capacity software product provides the ability to instantly increase or decrease computing capacity on specified HP enterprise servers.

NOTE

The name of the product has changed from Instant Capacity on Demand (or iCOD) to HP Instant Capacity for HP 9000 and HP Integrity Servers, also known as Instant Capacity or iCAP. In addition, Temporary Capacity on Demand (TiCOD) is now called Temporary Instant Capacity, or TiCAP. In this version, many of the commands, warning messages and error messages have been changed to refer to the software as iCAP. However, some internal files may still be named or refer to iCOD.

NOTE

For simplicity and commonality, this book uses the HP-UX commands in all examples. Refer to Appendix B for details on OpenVMS command equivalents.

With Instant Capacity, you initially purchase an HP enterprise server with a specified amount of active processing capacity, and a specified amount of inactive processing capacity.

Processing capacity consists of the system components:

- Processors containing cores
- Cell boards
- Memory

For each type of component, the number that can be active is equal to the number of usage rights applied to the complex for that type of component. Components purchased with a part number identifying them as "Instant Capacity" and without the label "Right to Use" come without

usage rights. Components which are not labeled as Instant Capacity implicitly include usage rights that can be applied to any component of that type installed on the complex.

Prior to activation of an inactive component, additional usage rights must be obtained. The fundamental method is to purchase usage rights by purchasing the appropriate Instant Capacity products that include the label "Right to Use (RTU)". HP then supplies a Right to Use (RTU) codeword. When the codeword is applied to the HP Enterprise server, the inactive component can be activated.

Additional methods for activating components for which usage rights have not been purchased include:

- If an HP-UX server is a member of a Global Instant Capacity Group (GiCAP), and if extra capacity is available from other members of the group, capacity may be "borrowed" from another member of the group. Global Instant Capacity is described in Chapter 7.
- You may purchase additional Temporary Instant Capacity (TiCAP) and apply the temporary capacity codeword in order to activate one or more cores for a temporary period of time. Temporary Instant Capacity is described in Chapter 5. If a server is a member of a Global Instant Capacity Group, TiCAP on other members can be used to share temporary capacity with other members of the group.
- You may temporarily activate one or more inactive cores using the Instant Access Capacity (IAC) provided with the initial purchase of the Instant Capacity component. Instant Access Capacity is exactly the same as Temporary Instant Capacity except it is automatically provided with an Instant Capacity component and is not separately purchaseable. It provides an immediate buffer of temporary capacity in case extra capacity is needed before there is time to purchase an RTU codeword, a TiCAP codeword, or to setup a GiCAP group on an HP-UX system.

IMPORTANT

It is always a good idea to keep some quantity of temporary capacity in reserve. Purchase of codewords may take one or more days, so having a buffer of temporary capacity allows you to avoid delays in activation of additional cores. The Instant Access Capacity provides this buffer initially, but as that capacity is depleted, ongoing purchases of additional Temporary Instant Capacity are recommended to replenish this capacity.

About this guide

Introduction

The Instant Capacity software product is a part of the HP Utility Pricing Solutions (formerly On Demand Solutions) program.

This user's guide provides you with the most recent information on using the Instant Capacity versions 8.x software to manage processing capacity in your HP enterprise server.

NOTE

All personnel with system administrator access (that is, root login privileges) to an Instant Capacity system should read and understand the contents of this document and the implications of increasing processing capacity.

How to Use this Guide

This user's guide is not designed to be read from front to back in its entirety. To get an understanding of Instant Capacity versions 8.x, you should read this chapter and *Chapter 2 - Getting Started*. After reading these two chapters, you can utilize the table of contents and index (in back) for specific topics of interest.

- *Chapter 1, About this Guide* provides an introduction to the guide, an overview of the Instant Capacity system, and locating Instant Capacity documentation.
- *Chapter 2, Getting Started* describes Instant Capacity requirements, concepts and methods, and related software topics.
- *Chapter 3, Installing and Uninstalling Instant Capacity Software* contains procedures on how to install and reinstall Instant Capacity software.
- *Chapter 4, Using Instant Capacity to Manage Processing Capacity* explains how to view system status, apply codewords, activate and deactivate cores, assign and unassign cells, and HP's test activation policy for Instant Capacity.
- *Chapter 5, Temporary Instant Capacity* gives you details on what temporary capacity is, and how to order and use it.
- *Chapter 6, Instant Capacity Cell Board* provides details on what Instant Capacity Cell Board is, and how to order and use it.
- *Chapter 7, Global Instant Capacity* gives you details on Global Instant Capacity, describes the concept of groups and shared resources, and how to order and use it.
- *Chapter 8, Troubleshooting* gives you step by step procedures to resolve problems with the Instant Capacity software and other related configurations.
- *Chapter 9, Frequently Asked Questions* contains questions and answers to common Instant Capacity software topics.
- *Appendix A, Special Considerations* describes assumed values in `icapstatus` output, upgrading to Instant Capacity versions 8.x software, dual core support, creating and shutting down partitions, implications of removing a cell board from an Instant Capacity system, `par` commands with PC SMS, integration with virtual

partitions and Psets, configuring e-mail, testing e-mail transmission of an asset report, measurement software, and dynamic processor resilience.

- *Appendix B, Considerations for OpenVMS Systems* contains information for running Instant Capacity on OpenVMS systems.
- *Appendix C, Instant Capacity HP-UX Manpages* contains the actual HP-UX manpages for `icap`, `icapmanage`, `icapmodify`, `icapnotify`, `icapstatus`, and `icapd`.
- *Appendix D, Glossary* explains Instant Capacity systems and software terms.

Documentation Feedback

We welcome any feedback that helps us improve the quality of our documentation. To provide feedback, go to the following HP web site:
<http://docs.hp.com/assistance/feedback.html>

Be sure to reference the Instant Capacity User's Guide and the page numbers of recommended changes in your feedback message.

Terminology

See “Instant Capacity Terminology” on page 260 for commonly used terms associated with the HP Utility Pricing Solutions program.

Overview

Software Product Overview

The Instant Capacity versions 8.x software products associated with HP's Utility Pricing Solutions program are:

- **iCOD:** HP product number B9073BA (HP-UX)
- **iCAP:** HP OpenVMS product number BA484AA

Only versions 8.x information is in this user's guide.

Instant Capacity must be run on a partitionable system. In an HPVM environment, Instant Capacity software provides meaningful functionality only on the VM Host system; it does not run on a virtual machine (also known as a "guest").

The Instant Capacity product has been available since March 2000 (version B.01.00).

The HP-UX versions 8.x software can be obtained from the following HP web site (search for "Instant Capacity"):

<http://www.hp.com/go/softwaredepot>

System Overview

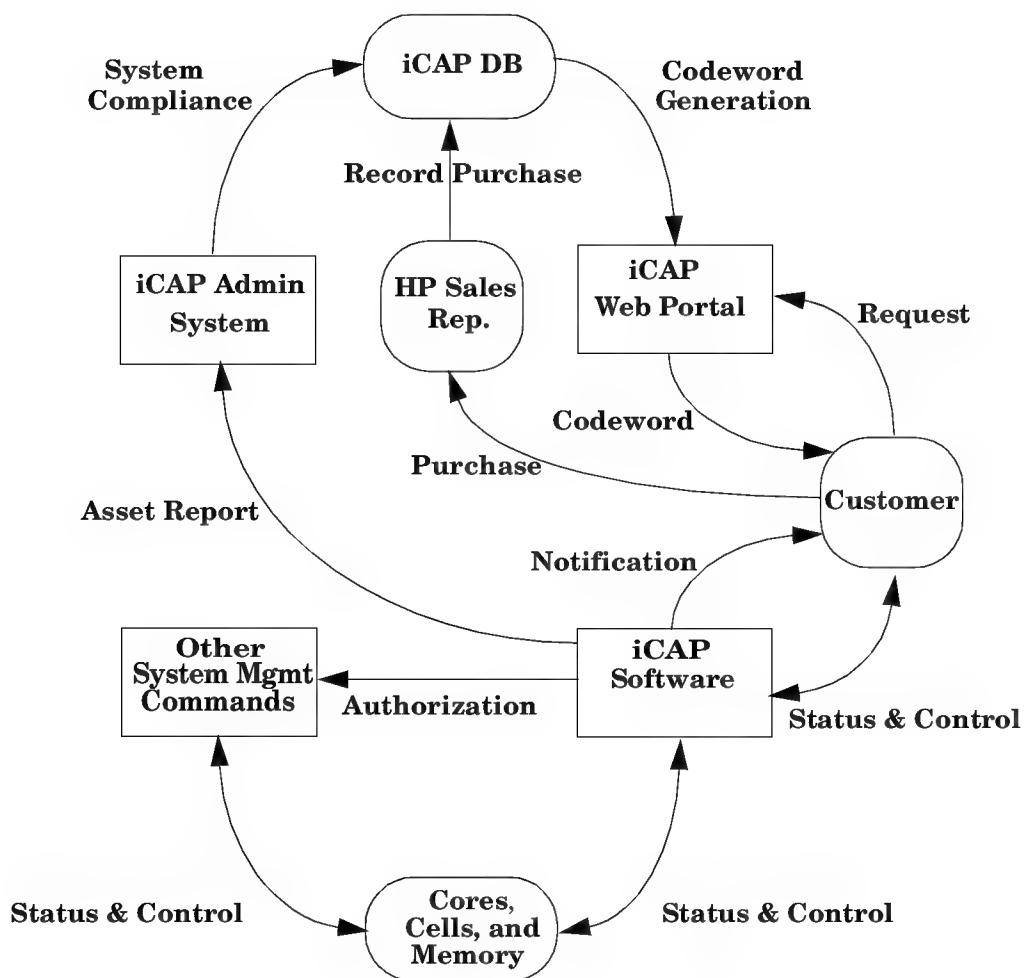
Instant Capacity versions 8.x consist of the following main elements and influences:

- Instant Capacity system hardware (including cells, cores, and memory)
- Instant Capacity software
- Utility Pricing Solutions portal
- Instant Capacity Administration System
- Instant Capacity database
- Other system management commands

See Chapter 2, "Getting Started," on page 25 for detailed information on Instant Capacity concepts and methods.

Figure 1-1

Instant Capacity System Elements



Instant Capacity System Hardware	<p>An Instant Capacity system's hardware is made up of the following components:</p> <ul style="list-style-type: none">• Cell boards• Processors which contain cores• Memory <p>Every Instant Capacity system contains a combination of the above components that are either purchased with usage rights (and available for activation) or purchased without usage rights (must be inactive). Note that while you purchase processors, the Instant Capacity software monitors and manages cores.</p>
Instant Capacity Software	<p>The Instant Capacity software provides the means to:</p> <ul style="list-style-type: none">• Increase or decrease (load balance) system processing capacity (<code>icapmodify</code> command)• View status and configuration of the system components (<code>icapstatus</code> command)• Administer system identification and notification information (<code>icapmodify</code> command)• Send system asset reports through encrypted e-mail to HP, if configured (<code>icapd</code> daemon on HP-UX, <code>ICAP_SERVER</code> process on OpenVMS)• Send configuration change notification, through encrypted e-mail, to the specified system-contact• Monitor and report system compliance (<code>icapd</code> daemon on HP-UX, <code>ICAP_SERVER</code> process on OpenVMS)• Manage Global Instant Capacity groups (<code>icapmanage</code> command) <p>See Appendix C, "Instant Capacity HP-UX Manpages," on page 211 for details of these commands.</p>
Utility Pricing Solutions Portal	<p>The Utility Pricing Solutions (or Instant Capacity) portal is located at the HP web site:</p> <p>http://www.hp.com/go/icap/portal</p> <p>After a component without usage rights is purchased, HP sends you a letter containing instructions on how to obtain a Right to Use (RTU) codeword from the Utility Pricing Solutions portal.</p>

About this guide

Overview

Instant Capacity Administration System	If asset reporting is configured, the <code>icapd</code> daemon sends asset reports, as encrypted e-mail messages, to the Instant Capacity Administration System, which saves information in the Instant Capacity database.
Instant Capacity Database	The Instant Capacity database is a repository on an HP server that tracks system compliance and provides the information for codeword generation.
Other System Management Commands	Other system management commands (for example, <code>vparmmodify</code> , <code>parCLI</code> and <code>parMgr</code>) provide an interface to modify system configuration which affects Instant Capacity contractual compliance.

Most Recent Instant Capacity Product Versions and Supported Platforms

Table 1-1

Most Recent Instant Capacity Versions and Supported Platforms

Software and Version	Operating System Version	Supported Hardware Platforms	Notes
iCOD B.11.23.08.00.01 (B9073BA)	HP-UX 11i v2	hp Integrity servers: <ul style="list-style-type: none">• Superdome• rx8640• rx8620• rx7640• rx7620 hp 9000 servers: <ul style="list-style-type: none">• Superdome• rp8420• rp8400• rp7420• rp7410	Available on: <ul style="list-style-type: none">• http://www.hp.com/go/softwaredepot• September 2006 HP-UX 11i v2 Operating Environments media• September 2006 HP-UX 11i v2 Applications Software media

Table 1-1 Most Recent Instant Capacity Versions and Supported Platforms (Continued)

Software and Version	Operating System Version	Supported Hardware Platforms	Notes
iCOD B.11.11.08.00.01 (B9073BA)	HP-UX 11i v1	hp 9000 servers: <ul style="list-style-type: none"> • Superdome • rp8420 • rp8400 • rp7420 • rp7410 	Available on: <ul style="list-style-type: none"> • http://www.hp.com/go/softwaredepot • September 2006 HP-UX 11i v1 Applications Software media
iCAP 8.0 (BA484AA)	hp OpenVMS I64 8.3	hp Integrity servers: <ul style="list-style-type: none"> • Superdome • rx8640 • rx8620 • rx7640 • rx7620 	Available on: <ul style="list-style-type: none"> • OpenVMS 8.3 Operating System media

Past Instant Capacity Versions and Supported Operating Systems

Instant Capacity Versions

Previous versions of the Instant Capacity software are:

- B.01.00 (on HP-UX 11.00)
- B.02.x (on HP-UX 11.00 and 11i v1)
- B.03.x (on HP-UX 11i v1)
- B.04.x (on HP-UX 11.00 and 11i v1)
- B.05.00 (on HP-UX 11.00 and 11i v1)
- B.06.x (on HP-UX 11i v1 and 11i v2)
- B.07.x (on HP-UX 11i v1 and 11i v2)
- B.08.00 (on HP-UX 11i v1 and 11i v2)

Instant Capacity Information

Instant Capacity User's Guide History

This is the second edition of the *HP Instant Capacity User's Guide for versions 8.x*.

Locating the Instant Capacity User's Guide for versions 8.x

You can find the *HP Instant Capacity User's Guide for versions 8.x* in the following locations:

- For the most up-to-date version of the user's guide and for localized language-specific versions, visit the following HP documentation web site (search for "Instant Capacity" + "User's Guide" + "versions 8.x"):
<http://docs.hp.com>
- September 2006 HP-UX 11i v1 Instant Information media
- September 2006 HP-UX 11i v2 Instant Information media
- In the Instant Capacity 8.x HP-UX software product, located in:
`/usr/share/doc/icapUserGuide.pdf`
Note, this is an early version of this document. For more current information see the user's guide on <http://docs.hp.com>.
- On the OpenVMS Version 8.3 Documentation CD
- For OpenVMS related information, visit the following web site:
<http://h71000.www7.hp.com/openvms/integrity/products.html>

Locating the Instant Capacity Release Notes for versions 8.x

You can find the *Instant Capacity Release Notes for versions 8.x* in the following locations:

- For the most up-to-date version of the release notes for HP-UX, visit the following HP documentation web site (search for "Instant Capacity" + "Release Notes" + "versions 8.x"):

About this guide

Instant Capacity Information

<http://docs.hp.com>

- September 2006 HP-UX 11i v1 Instant Information media
- September 2006 HP-UX 11i v2 Instant Information media
- In the Instant Capacity 8.x HP-UX software product, located in: /usr/share/doc/icapRelNotes.pdf. Note, this is an early version of this document. For the most recent information see the release notes on <http://docs.hp.com>.
- On the OpenVMS Version 8.3 Documentation CD
- For OpenVMS related information, visit the following web site: <http://h71000.www7.hp.com/openvms/integrity/products.html>

Manpages

NOTE

The information contained in this section applies only to HP-UX systems. It does not apply to Integrity servers running OpenVMS 8.3.

See Appendix C, “Instant Capacity HP-UX Manpages,” on page 211 for details of the following manpages:

- *icap* (5): an overview of the commands and their usage
- *icapd* (1M): an overview of the Instant Capacity daemon, which provides the software a complex-wide view of processing capacity
- *icapmanage* (1M): how to manage Global Instant Capacity (GiCAP) groups
- *icapmodify* (1M): how to manage processing capacity in your system, change system-contact information, and apply usage rights
- *icapnotify* (1M): how to manage asset notification
- *icapstatus* (1M): how to display processing capacity status, usage information, and system information

This chapter covers the following topics:

- “Instant Capacity Requirements” on page 26
- “Instant Capacity Components” on page 31
- “Instant Capacity Codewords” on page 35
- “Instant Capacity Compliance and Enforcement” on page 37
- “Configuration Change Notification” on page 39
- “Core Activation” on page 41
- “Temporary Instant Capacity (TiCAP)” on page 43
- “Instant Capacity Cell Board” on page 44
- “Instant Capacity Software Validation” on page 45
- “Instant Capacity System Status Reporting” on page 47
- “Timezone Considerations” on page 48

For more in-depth information, see the HP-UX manpage *icod* (5) on HP-UX systems.

Instant Capacity Requirements

Program Requirements

You must comply with the following HP Utility Pricing Solutions conditions to participate in the Instant Capacity versions 8.x program:

- Maintain the HP Instant Capacity software on each HP-UX or OpenVMS partition in the system — it is a non-intrusive and low-overhead software module that resides on the partition
- Migrate to later Instant Capacity software versions as they become available

For the specific details on your individual program requirements, refer to your Utility Pricing Solutions contract from HP or your authorized channel partner. Participants of the Utility Pricing Solutions program who do not meet these requirements may be in breach of contract. This results in unnecessary expense for both the program participant and HP.

Software Requirements

Every HP-UX and OpenVMS partition in an Instant Capacity system is required to have the Instant Capacity software installed and the `icapd` daemon running on HP-UX systems, or the `ICAP_SERVER` process running on OpenVMS systems. You must maintain the Instant Capacity software until all program requirements are fulfilled and the system is no longer considered an Instant Capacity system. If you are using Global Instant Capacity, all systems must be running Instant Capacity versions 8.x.

NOTE

For necessary HP-UX updates, we recommend that you install the latest OEUR or AR update, if possible. This ensures that you install all required products and versions.

HP-UX 11i v1 Requirements

For Instant Capacity Versions 8.x on HP-UX 11i v1

The following software is required for Instant Capacity versions 8.x on HP-UX 11i v1:

- HP-UX 11i v1 September 2006 update, or later
- iCOD software bundle B9073BA (versions 8.x) — installed automatically when the HP-UX 11i v1 Operating Environment (OE) is installed
- The kernel configuration must include the diag2 module
- WBEM B8465BA bundle (version A.02.00.04 or higher)
- NParProvider bundle (version B.12.01.06.01 or higher, available from the OE)
- If you have a virtual partitioned environment, the Virtual Partitions software (bundle T1335AC) must be version A.02.03 or greater
- (GiCAP only) OpenSSH Secure_Shell T1471AA bundle, distributed with the Operating Environment, although a newer version may be available from the HP software depot (<http://www.hp.com/go/softwaredepot>)

Required Patches for HP-UX 11i v1

The following patches are required for Instant Capacity versions 8.x on HP-UX 11i v1:

- PHKL_22987: S700_800 11.11 pstat() patch - Only if your system runs MeasureWare software
- PHKL_23154: S700_800 11.11 dflush() patch
- PHKL_25218: S700_800 11.11 PDC Call retry, PDC_SCSI_PARMS, iCOD hang fix
- PHKL_26232: S700_800 11.11 Psets Enablement patch, FSS iCOD patch
- PHKL_30197: S700_800 11.11 Psets & vPar, Reboot hangs, serial number
- PHCO_24396: S700_800 11.11 /etc/default/tz patch
- PHCO_24477: S700_800 11.11 sar (1M) patch
- PHCO_29832: S700_800 11.11 reboot (1M) patch
- PHCO_29833: S700_800 11.11 killall (1M) patch

IMPORTANT

For the most recent required patches, see the Instant Capacity Installation page on the HP web site
<http://www.hp.com/go/softwaredepot> (search for “B9073BA”).

HP-UX 11i v2 Requirements

**For Versions 8.x
on
HP-UX 11i v2**

The following software is required for Instant Capacity versions 8.x on HP-UX 11i v2:

- HP-UX 11i v2 September 2006 update, or later
- iCOD software bundle B9073BA (versions 8.x) — installed automatically when the HP-UX 11i v2 Operating Environment (OE) is installed
- The kernel configuration must include the diag2 module
- WBEM B8465BA bundle (version A.01.05 or higher)
- NParProvider bundle (version B.23.01.06.01 or higher, available from the OE)
- If you have a virtual partitioned environment, the Virtual Partitions software (bundle T1335BC) must be version A.04.01 or greater
- (GiCAP only) OpenSSH Secure_Shell T1471AA bundle, distributed with the Operating Environment, although a newer version may be available from the HP software depot (<http://www.hp.com/go/softwaredepot>)
- The PHCO-34721 killall patch is required for 11i v2 installations

NOTE

On HP-UX 11i v2 systems, updated firmware may be required by either or both of the NPar or Virtual Partitions software, as documented for these products.

Your Instant Capacity system is ordered and shipped with all of the above software. In the event your system’s operating system is reinstalled or installed with Ignite-UX, ensure that the above software requirements are satisfied.

OpenVMS 8.3 Requirements

For Instant Capacity Versions 8.x on OpenVMS 8.3

The following software is required for Instant Capacity versions 8.x on OpenVMS 8.3:

- hp OpenVMS Industry Standard 64 Operating System V8.3, or later
- iCAP software bundle BA484AA (versions 8.x) — included with OpenVMS 8.3 and automatically installed on relevant systems when 8.3 is initially installed
- WBEMCIM bundle (version A2.0-A051013F or higher) — optionally installed with OpenVMS 8.3
- NParProvider bundle — installed with OpenVMS 8.3

E-mail Requirements

For some configurations, previous versions of the Instant Capacity software (prior to B.07.x) required e-mail connectivity to HP in order to send asset reports as encrypted e-mail messages. Instant Capacity versions B.07.x and later no longer require e-mail connectivity or asset reporting, however, you may choose to configure it because it can be useful for viewing complex-wide asset information at the Utility Pricing Solutions portal (<http://www.hp.com/go/icap/portal>).

NOTE

Asset reporting is on by default for a new installation. Unless you turn asset reporting off or configure the e-mail connectivity, error messages will be logged when the software attempts to send asset reports. The `icapstatus` command displays the current configuration for asset reporting. You turn asset reporting on or off with the `icapnotify -a` command. For details about how to configure e-mail connectivity, see “Configuring E-Mail on Instant Capacity Systems” on page 184.

Roles Requirement

Your organization may designate a person to fill a system-contact role for the successful management of Instant Capacity systems. The system-contact receives the following types of e-mail messages from the Instant Capacity software:

- Core activation or deactivation notification
- Compliance exception notification
- Temporary capacity expiration notification
- Temporary capacity enforcement notification
- Virtual partition boot time compliance notification

If a system-contact is not specified, core change notification e-mail messages are not sent from the Instant Capacity partition. However, the root account on HP-UX and the SYSTEM account on OpenVMS continue to receive other notification messages.

Usage Rights Requirement

A system managed under the Instant Capacity program may include one or more components (core, cell, or memory) that are without usage rights. Before you can use these components, additional usage rights must be obtained. Usage rights can either be purchased from HP, or if the system is a member of a Global Instant Capacity group, usage rights may be temporarily borrowed from another member of the group, as described in the section “Global Instant Capacity Sharing Rights” on page 122.

Purchase of usage rights from HP is managed through the use of Right To Use (RTU) codewords. Contact your HP sales representative in order to purchase component-specific usage rights. After such a purchase, HP sends you a letter informing you how to retrieve the RTU codeword from the HP Utility Pricing Solutions web portal, located at:

<http://www.hp.com/go/icap/portal>

After the RTU codeword is retrieved from the Utility Pricing Solutions portal, the RTU codeword is applied to your server by the use of the `icapmodify` command, using the `-C` option. When the codeword is applied, component-specific usage rights on the system are increased, allowing you to activate one or more additional components.

Instant Capacity Components

Overview

The Instant Capacity software monitors and enforces compliance with contractual agreements. It authorizes or denies activation of system components (cores, cells, memory) based on a complex-wide database of usage rights. See “Usage Rights Requirement” on page 30 for details about acquiring additional usage rights.

Activation of components is restricted according to complex-wide compliance for each component type. A complex is in a compliant state when the number of active components of a given type does not exceed the number of that component’s available usage rights on the complex.

Cores (Processors)

While you purchase Instant Capacity processors for your system, the Instant Capacity software monitors and manages the total number of cores. For example, a dual core Instant Capacity processor is treated as two cores without usage rights.

The Instant Capacity software enforces compliance for cores by comparing the number of actual inactive cores with the expected number of inactive cores, that is the number of cores without usage rights for the entire complex, according to the contract with HP. Available core usage rights may be used to activate any core in an active cell board. Note also that Temporary Capacity may be used to activate cores beyond the number of available core usage rights for the complex, but only for a limited period of time.

NOTE

Unless a system participates in a GiCAP group (see Chapter 7), usage rights are complex-wide (single node for OpenVMS) only. If components are moved from one complex to another, the counts of allowable active and inactive components do not change for either complex. In particular, the number of “expected inactive” components of each type does not change if components are removed. This means that the removal of *inactive* components from a complex can cause that complex to be out of compliance with the Instant Capacity contract because there are fewer

visible inactive components than the complex-wide count of components without usage rights. The complex may even become unusable as would happen in the case where enough other cores must be made inactive to meet compliance, that there are no longer enough active cores to have at least one active core per configured cell.

Cell Boards

Instant Capacity offers you a way to have additional (inactive) cell board capacity in your system for growing business needs. When the need arises, these cell boards, which contain memory and cores, are available for instant activation and use after reboot when additional cell board usage rights are purchased from HP and an RTU codeword is applied. As with cores, the Instant Capacity software enforces compliance by comparing the number of actual inactive cells with the expected number of inactive cells, which is the number of cells without usage rights for the entire complex.

The cell board, memory, and core usage rights are tracked separately. To activate an Instant Capacity cell, you must acquire sufficient cell usage rights, as well as sufficient memory usage rights to enable all the memory attached to the cell. You cannot activate a cell board without activating all attached memory, so when you purchase an RTU for a cell you need to purchase an RTU for the cell's memory. These are normally bundled together in a single purchase.

Depending on the need, you may want to activate one or more cores at the same time the cell and memory are activated, so you may also need to acquire additional core usage rights. After a cell board is activated, all of the cores on the cell board are available for activation if the complex has enough available core usage rights or temporary capacity. Since usage rights for all types of components can be conveyed with a single RTU codeword, it is particularly useful to anticipate the core and memory needs when purchasing cell board usage rights.

IMPORTANT

You must have one active core for each active cell board.

Memory

As with other components, the Instant Capacity software enforces compliance for memory by comparing the amount of actual inactive memory with the expected inactive memory, which is the amount of memory without usage rights for the entire complex.

Memory is contained in a cell board. An Instant Capacity cell board must be activated before its memory can be used. You cannot activate a cell board without activating all attached memory. You must have enough available memory usage rights to activate all the memory on the cell board.

Global Instant Capacity (HP-UX)

Global Instant Capacity, or GiCAP, provides HP customers with the flexibility to move usage rights (RTUs) for Instant Capacity components within a group of servers. It also provides “pooled” temporary capacity across the group. This provides more cost-effective high availability, more adaptable load balancing, and more efficient and easier use of temporary capacity.

Global Instant Capacity is built on the concept of a server group, or GiCAP Group. This is a list of servers that are allowed to share iCAP usage rights. In addition, at least one HP-UX system running iCAP must be designated as the Global Instant Capacity Group Manager. The Group Manager hosts the GiCAP software that maintains a database of information about the group and about group resources (usage rights and temporary capacity). A GiCAP group is managed using the command `icapmanage` on the Group Manager system.

While GiCAP is part of Instant Capacity and is installed at the same time as iCAP, it is not enabled during installation. In order to share resources across groups, you must purchase a GiCAP Sharing Rights codeword from the iCAP portal. Application of the Sharing Rights codeword to the Group Manager system enables the creation of a GiCAP Group containing members that have Instant Capacity components without usage rights on every partition. All GiCAP group members must run Instant Capacity version 8.x.

Instant Capacity now allows deactivations of cores on non-Instant Capacity systems (those without any Instant Capacity components), allowing such systems to participate in a GiCAP group and loan usage rights to Instant Capacity systems.

Instant Capacity Codewords

Instant Capacity uses codewords for several purposes: to adjust available usage rights for system components (RTU codewords), to apply an amount of temporary capacity to the system, and to apply Sharing Rights to a GiCAP Group Manager system to enable the creation of one or more groups.

All types of codewords must be purchased as specific product numbers from HP. After purchase, the actual codeword (an encrypted string) can be retrieved from the Utility Pricing Solutions web portal. When you retrieve codewords from the portal, you must provide the sales order number for the codeword purchase and the serial number of the system. See the Utility Pricing Solutions web portal information in “System Overview” on page 17 for details.

Once obtained from the portal, the rules and uses of GiCAP codewords are very different from other types of Instant Capacity codewords. The GiCAP codewords are described in “Global Instant Capacity Sharing Rights” on page 122 and are referred to as “GiCAP codewords”. Other types of codewords are referred to as “iCAP codewords”.

The following codewords are applied to a server using the `icapmodify -C` command:

- Core RTU
- Cell board RTU
- Memory RTU
- Temporary capacity

See “Acquiring and Configuring Temporary Instant Capacity” on page 87 for details on the use of temporary capacity codewords.

Application of an RTU codeword adjusts the number of component-specific usage rights on the system. As a result, more components can be simultaneously active.

IMPORTANT

iCAP codewords are based on both the serial number of a system and a unique sequencing value for that server. These codewords must be applied in the sequence in which they are obtained for a particular server. They can be applied to any partition on the server.

Instant Capacity Compliance and Enforcement

The Instant Capacity software primarily maintains complex-wide information about the usage rights and activation of system components. (If you are using Global Instant Capacity, then the software also maintains group-wide information about usage rights. See Chapter 7 for more information about GiCAP.) The software monitors the number of usage rights for the entire complex for each type of component.

The Instant Capacity software authorizes activation at will of cores, cells, and memory if allowed by the system usage rights. You will not be allowed to activate additional components if that action would take the system out of compliance.

For example, if your Instant Capacity contract specifies that your system contains 12 cores with usage rights and 4 cores without usage rights, you may have up to 12 cores activated at any one time, and 4 cores must be inactive at all times.

The Instant Capacity software can determine the following compliance aspects:

- Whether a system is in compliance or out of compliance with the Instant Capacity contract
- The number of additional cores that can be activated
- The number of additional cells and the quantity of memory that can be activated

The enforcement methods used by the software include:

- Not allowing activations which cause the system to be out of compliance
- Deactivating cores on boot
 - Automatic deactivation of cores at boot time if temporary capacity has been exceeded and the number of active cores continues to exceed the number of core usage rights for the complex (see “Temporary Instant Capacity Expiration and Compliance Enforcement” on page 94)

Getting Started

Instant Capacity Compliance and Enforcement

- In an integrated virtual partition environment, preventing a virtual partition from booting if the number of assigned cores is greater than the number of intended active cores for the nPartition (see “Boot Time Compliance” on page 177)
- On OpenVMS systems, the ICAP_SERVER dynamically deactivates active cores that exceed the number of core usage rights for the complex

Configuration Change Notification

Specifying an increase or decrease in the number of active cores — using the `icapmodify` command — causes a core configuration change. A notification e-mail is sent to the system-contact when a change occurs that affects the configuration of cores.

If you do not desire a notification e-mail to be sent whenever a configuration change is made, you may disable this feature by using the following command on HP-UX:

`/usr/sbin/icapnotify -n off`

Here is an example of the configuration change notification e-mail message the Instant Capacity software sends to the system-contact. Note that if the operation was a deferred configuration change, “previous” and “current” would show equal values; only the “Number of cores to be active after reboot” would reflect the requested change.

Getting Started

Configuration Change Notification

Example 2-1

Configuration Change Notification E-Mail for (non vPar) Instant Capacity System

Subject: Instant Capacity Configuration Change Notification

A configuration change has been made to the following system:
super.corp.com

One or more cores were activated.

Details of the change include:

Time of change:	05/08/06 11:00:00
Deferred change:	No
Previous number of active cores:	3
Current number of active cores:	4
Number of cores to be active after reboot:	4

Description of change: New fiscal year increase
Person making change: Mary Jones
System contact e-mail: mjones@corp.com

If you are the system contact and do not want to receive this type of notification in the future, it can be disabled by executing the following command on the system in question:

/usr/sbin/icapnotify -n off

To turn notification on, execute:

/usr/sbin/icapnotify -n on

Core Activation

As previously mentioned, an Instant Capacity system contains a specified quantity of activated processing capacity (cells, cores, and memory) and a specified amount of deactivated processing capacity. Systems may have fewer active components than they have rights to activate. Such systems may instantly activate additional components without the need to purchase an RTU, up to the number of component usage rights on the system.

Increasing Processing Capacity by RTU Purchase

When the processing demand significantly changes, you can enable use of additional system components using the following procedure:

- Step 1.** Purchase additional usage rights for a component type — this is accomplished by sending a purchase order (P/O) to HP for an RTU product. Soon after your P/O is received by HP, you should receive a letter from HP that contains information about retrieving the RTU codeword from the Utility Pricing Solutions web portal.
- Step 2.** Acquire the RTU codeword from the Utility Pricing Solutions web portal, <http://www.hp.com/go/icap/portal>
- Step 3.** Apply the RTU codeword — by using the `icapmodify -C` command/option (note the `-C` option is uppercase) on any partition in the complex
- Step 4.** Activate a component — depending on the type of component, this is accomplished as follows:
 - a.** Activate a core in a hard partition (npar) by use of the `icapmodify -a` command. Note: For details about activating a core in a virtual partition, see “Instant Capacity Integration with Virtual Partitions (HP-UX only)” on page 172.
 - b.** Activate a cell board by using the `parmmodify` or `parmgr` command. See “Activation of an Instant Capacity Cell Board” on page 111 for details on activation of cell boards (and memory).

IMPORTANT

To avoid a delay in activation of additional cores, it is a good idea to purchase and keep in reserve some quantity of Temporary Instant Capacity for the system. Temporary Instant Capacity can be used to instantly and temporarily activate cores while waiting for an RTU codeword to be acquired, as in Step 1. See Chapter 5 for details about Temporary Instant Capacity. You may also temporarily activate one or more cores using the Instant Access Capacity (IAC) provided with the purchase of Instant Capacity processors.

Temporary Instant Capacity (TiCAP)

You can purchase an amount of temporary processing capacity for your Instant Capacity system. Temporary capacity is purchased in units of multiple days. Temporary capacity allows one or more cores beyond the count allowed by the available usage rights to be activated for up to the specified period of prepaid minutes without requiring the purchase of additional usage rights.

You can activate and deactivate cores as you wish until the activation time equals your prepaid temporary capacity duration. For example, with a prepaid duration of 30 days of temporary capacity, you can activate one core for 30 days or four cores for one hour a day for 180 days (or any combination that totals 43,200 minutes).

NOTE Temporary Capacity cannot be used to activate cores in inactive Instant Capacity cell boards.

Your temporary capacity balance is decreased only when you are using more cores than normally allowed by your available core usage rights. The charge against temporary capacity is not associated with specific cores or partitions. That is, if you have activated one core in partition A using temporary capacity, and then deactivate any core in partition B, the complex will stop using temporary capacity.

Temporary capacity can be added to an Instant Capacity system by purchasing and applying a temporary capacity codeword (available from the Utility Pricing Solutions portal) using the `icapmodify -C` command/option.

The `icapstatus` command provides information on the amount of temporary capacity time remaining on the complex.

See Chapter 5, “Temporary Instant Capacity,” on page 83 for more information.

Instant Capacity Cell Board

Instant Capacity Cell Board allows you to have additional (inactive) cell board capacity in your system for growing business needs. When the need arises, additional cell and memory usage rights can be purchased and then the inactive cell boards, which contain memory and cores, are then available for instant activation and use.

The Instant Capacity software monitors and enforces the count of inactive cell boards (without usage rights) throughout the complex. Inactive cell boards assigned to a partition have the use-on-next-boot flag set to “n” (no).

After applying a cell board and memory codeword to convey additional usage rights, you may activate any cell board with memory not exceeding the amount allowed by the available memory usage rights, and configure the cell into an nPartition. This is controlled by setting the use-on-next-boot flag to “y” (yes) with the `parmodify` command after the cell is configured and assigned to the partition, and rebooting the nPartition.

IMPORTANT

An active cell board must have a minimum of one active core; therefore, you must also have sufficient core usage rights on the complex to activate at least the one core per cell board. The Instant Capacity software will redistribute active cores across all cell boards of the partition. Temporary capacity can be used to activate this core but the system needs to have at least one core usage right for each active cell. Also, if you are creating a new partition for the new cell board, additional constraints apply and you may need to acquire additional core usage rights. See “New Partition Creation and Instant Capacity” on page 166.

See Chapter 6, “Instant Capacity Cell Board,” on page 101 for more information.

Instant Capacity Software Validation

On HP-UX Systems

The Instant Capacity software (HP-UX product B9073BA) is installed by HP manufacturing on instantly ignited HP-UX systems. The Instant Capacity software can also be installed by an HP service representative on existing (supported) HP-UX enterprise servers as an add-on.

NOTE The Instant Capacity software is automatically installed when the HP-UX 11i v2 or 11i v1 Operating Environment (OE) is installed.

To verify the Instant Capacity software is installed on your system, execute the following HP-UX command:

/usr/sbin/swlist B9073BA

You should see output similar to:

B9073BA B.11.23.08.00 HP-UX iCOD Instant Capacity (iCAP)

To ensure the Instant Capacity software installation has not been corrupted, execute the following HP-UX command:

/usr/sbin/swverify B9073BA

You should see Verification succeeded. in the output of the swverify command.

On OpenVMS Systems

On OpenVMS systems, the Instant Capacity software is automatically installed on partitionable systems when the OpenVMS I64 V8.3 or later operating system is installed. You should not need to install iCAP software separately on OpenVMS systems. On-site iCAP installation by an HP service representative after the initial installation of OpenVMS 8.3 is not an option for OpenVMS systems.

On OpenVMS systems, run the following commands to verify the Instant Capacity software is installed and configured:

Getting Started

Instant Capacity Software Validation

```
$ @sys$manager:ICAP$CLI_UTILS.COM CONFIG_CHECK
$ show log ICAP$CONFIGURED
"ICAP$CONFIGURED" = "TRUE" (LNM$JOB_nnnnnnnn)
```

Instant Capacity System Status Reporting

You can use the `icapstatus` command to view the status of your Instant Capacity system. With no options, the `icapstatus` command provides the following information:

- Version number of the Instant Capacity software
- System identification information (system ID, serial number, current product number, unique ID)
- E-mail addresses for both the system contact (mail to the local system) and a “From” address (mail from the local system)
- Asset reporting status (on or off)
- Temporary capacity warning period (in days)
- Exception status (indicates if complex is in an exception state)
- If part of a GiCAP group, group membership information, including borrow/loan status
- Local partition information
- Instant Capacity Resource information for the entire complex
- Allocation of Instant Capacity Resources among the hard partitions

See “Checking the Status of your Instant Capacity System” on page 58 for information on what is reported by the `icapstatus` command. See “`icapstatus (1M) Manpage`” on page 246 for detailed information on the `icapstatus` command.

Timezone Considerations

On HP-UX systems, the `icapd` daemon performs routine Instant Capacity software tasks on a daily basis. A partition's local timezone setting affects what timezone the `icapd` daemon uses for the timing of these tasks, so you should ensure that the timezone is set properly to ensure synchronization among the partitions.

Because the HP-UX `icapd` daemon is started by `init`, the `/etc/default/tz` file needs to contain the desired timezone specification. By default, the timezone is set to `EST5EDT`. You can specify the timezone the `icapd` daemon uses to interpret noon and midnight by modifying the entry in the `/etc/default/tz` file.

On OpenVMS systems, the `ICAP_SERVER` uses the timezone settings defined by the `SYS$STARTUP:TDF$UTC_STARTUP.COM` file. To view the timezone settings, use `@sys$manager:utc$time_setup "show"`. Use `@sys$manager:utc$time_setup` and follow the menu instructions to modify the timezone setting for the iCAP partition.

Installing and Uninstalling Instant Capacity Software

This chapter covers the following topics:

- “Installing Instant Capacity Software” on page 50 below
- “Reinstalling Instant Capacity Software” on page 54
- “Uninstalling Instant Capacity Software” on page 55

Installing Instant Capacity Software

Factory Integrated Systems The Instant Capacity software is installed by HP on all HP enterprise servers, even those without Instant Capacity components. You can use the following HP-UX command to verify that the software is installed and configured:

/usr/sbin/swverify B9073BA

You should see *Verification succeeded.* in the output of the *swverify* command.

IMPORTANT The Instant Capacity software is automatically installed when the HP-UX 11i v2 or 11i v1 Operating Environment (OE) is installed. If any partition in the system has version B.06.x or later installed, then all partitions in the system with Instant Capacity software must be running version B.06.x or later. See “Upgrading to Instant Capacity versions B.06.x or later (HP-UX)” on page 162 for details of upgrading the software from a version previous to B.06.x.

For HP-UX you should not need to install the Instant Capacity software; however, if you do, it is available from the following media/locations:

- HP software depot (HP web site:
<http://www.hp.com/go/softwaredepot>)
- September 2006 HP-UX 11i v2 Operating Environment (OE) media
- September 2006 HP-UX 11i v2 Applications Software media
- September 2006 HP-UX 11i v1 Applications Software media

The following instructions can be used to install versions 8.x:

For HP-UX 11i v1 and 11i v2 - Installing from the HP-UX Media

Follow this procedure to install the Instant Capacity software on your HP-UX 11i v2 system from either the appropriate HP-UX Applications Software or Operating Environment media:

Step 1. Log in as `root`.

Step 2. Determine the DVD drive device file by entering the following command:
`ioscan -fnC disk`

Step 3. Insert the appropriate HP-UX Applications Software or Operating Environments DVD into the DVD drive.

Step 4. Mount the DVD drive to the desired directory. The following example uses the `/dev/dsk/c1t2d0` device file (from **Step 2**, above) and the `/dvd` directory. To mount the DVD drive, enter a similar command as:

Mount Example:
`mount -r /dev/dsk/c1t2d0 /dvd`

Step 5. Install the B.08.x bundle B9073BA from the DVD:
`swinstall -s /dvd B9073BA`

Step 6. Continue with “For All HP-UX Installations” on page 52.

For HP-UX 11i v1 and 11i v2 - Installing from the HP Software Depot

Step 1. Do a search for “B9073BA” at HP’s Software Depot web site:
<http://www.hp.com/go/softwaredepot>

Step 2. Select the link that appeared as a result of your search, and follow the instructions on the Installation page.

Step 3. Continue with “For All HP-UX Installations” on page 52.

For All HP-UX Installations

After you have successfully installed the Instant Capacity software using the `swinstall` command, perform the following procedure to validate your installation:

- Step 1.** Execute the command: `/usr/sbin/icapstatus`
- Step 2.** Verify that the `icapstatus` command's output indicates the correct number of components without usage rights for cells, cores, and memory.

If any number is incorrect, contact the Instant Capacity administrator at the following e-mail address:

`icap_admin@hp.com`

- Step 3.** Log in as `root`
- Step 4.** Set the system-contact information by entering the following command:
`/usr/sbin/icapmodify -c <contact_email_address>`
- Step 5.** If you wish to configure asset reporting, then ensure that outgoing mail can be sent to HP mail servers from your system, even if the system is behind a firewall. See "Diagnosing E-mail Configuration" on page 148.

- Test the transmission of your asset report, via e-mail to HP, by entering the following command:
`/usr/sbin/icapnotify <reply_address>`

The `icapnotify` command sends an asset report to HP, `root`, and the supplied reply address.

HP responds with a reply e-mail to the reply address after the asset report is received.

- Use an e-mail client to verify the return e-mail from HP to the reply e-mail address.

Installing Instant Capacity on OpenVMS Systems

On OpenVMS systems, the Instant Capacity software is automatically installed on partitionable systems when the OpenVMS I64 V8.3 or later operating system is installed. You should not need to install iCAP software separately on OpenVMS systems. iCAP hardware components

Installing and Uninstalling Instant Capacity Software
Installing Instant Capacity Software

have already been configured at the factory before delivery. The Instant Capacity software is included on the OpenVMS 8.3 Operating Systems media.

Run the following OpenVMS commands to verify the Instant Capacity software is installed and configured:

```
$ @sys$manager:ICAP$CLI_UTILS.COM CONFIG_CHECK
$ show log ICAP$CONFIGURED
"ICAP$CONFIGURED" = "TRUE" (LNM$JOB_nnnnnnnn)
```

Reinstalling Instant Capacity Software

Preserving current Instant Capacity information

If you reinstall HP-UX on a partition with Instant Capacity (for example, installing HP-UX by either cold-installing or installing from a “golden image”), all information in the Instant Capacity configuration file disappears unless you do the following:

1. Before the reinstall, manually save your Instant Capacity data and processor allocation history by backing up the following files:
 - a. HP-UX: /etc/.iCOD_data
OpenVMS: SYS\$SYSTEM:SYS\$ICAP.DAT
 - b. HP-UX: /var/adm/icap.log
OpenVMS: SYS\$MANAGER:ICAP.LOG
 - c. HP-UX: /var/adm/icap.log.old

These files are restored in **Step 3** below.
2. Install the appropriate HP-UX or OpenVMS Operating Environment (OE) from its media onto the partition. The Instant Capacity software bundle B9073BA is installed automatically when the HP-UX OE is installed, and the Instant Capacity software bundle BA484AA is installed automatically on OpenVMS systems.
3. Restore your Instant Capacity data and processor allocation history files:
 - a. HP-UX: /etc/.iCOD_data
OpenVMS: SYS\$SYSTEM:SYS\$ICAP.DAT
 - b. HP-UX: /var/adm/icap.log
OpenVMS: SYS\$MANAGER:ICAP.LOG
 - c. HP-UX: /var/adm/icap.log.old
4. If the system is a Global Instant Capacity Group Manager, additional steps described in Chapter 7 are necessary to configure the Group Manager.

If the above procedure is not done, all of the Instant Capacity change history and system-contact information is lost.

Uninstalling Instant Capacity Software

IMPORTANT

The Instant Capacity software should not be uninstalled. You should not attempt to remove it.

Installing and Uninstalling Instant Capacity Software

Uninstalling Instant Capacity Software

Using Instant Capacity to Manage Processing Capacity

This chapter covers the following topics:

- “Checking the Status of your Instant Capacity System” on page 58
- “Setting System-Contact Information” on page 61
- “Applying a Right To Use (RTU) Codeword” on page 63
- “Activating Cores” on page 66
- “Deactivating Cores” on page 69
- “Overriding Deferred Activations and Deactivations” on page 71
- “Load-Balancing Active Cores” on page 73
- “Assigning a Cell to a Partition” on page 74
- “Unassigning a Cell from a Partition” on page 76
- “Software Application Considerations” on page 79
- “Test Activation of Cores Using Temporary Capacity” on page 80
- “Replacement of Failed Cores” on page 81

Checking the Status of your Instant Capacity System

You can use the `icapstatus` command to view the status of your Instant Capacity system. With no options, the `icapstatus` command provides the following information:

- Version number of the Instant Capacity software
- System identification information (system ID, serial number, product number, unique ID)
- System-contact e-mail address
- Instant Capacity From e-mail address
- Asset reporting status (on or off)
- Temporary capacity warning period (in days)
- Exception status (indicates if complex is in an exception state)
- If a member of a GiCAP group, membership information and borrow/loan status of usage rights
- Local virtual partition status (if applicable):
 - Total number of assigned cores
 - Number of active assigned cores
 - Number of inactive assigned cores
 - Additional cores that can be assigned with current usage rights
 - Number of cores that could be assigned with additional usage rights
 - Number of cores that can be assigned with temporary capacity
 - Number of cores that are deconfigured or attached to inactive cells
- Local nPartition status:
 - Total number of configured cores
 - Number of Intended Active cores

Using Instant Capacity to Manage Processing Capacity
Checking the Status of your Instant Capacity System

- Number of active cores
- Number of inactive cores
- Additional cores that can be assigned with current usage rights
- Number of cores that could be assigned with additional usage rights
- Number of cores that can be assigned with temporary capacity
- Number of cores that are deconfigured or attached to inactive cells
- Instant Capacity resource summary:
 - Number of cells without usage rights
 - Number of inactive cells
 - Amount of memory without usage rights
 - Amount of inactive memory
 - Number of cores without usage rights
 - Number of inactive cores
 - Number of cores that must be deactivated (insufficient usage rights)
 - Temporary capacity available
- Allocation of Instant Capacity Resources among the Hard Partitions:
 - nPar ID
 - Total Cores
 - Intended Active Cores
 - Actual Active Cores
 - Inactive Cores
 - Inactive Memory
 - Inactive Cells
 - Runs iCAP (indicates whether the hard partition contains compatible Instant Capacity software)
 - nPar Name

Using Instant Capacity to Manage Processing Capacity

Checking the Status of your Instant Capacity System

See “**icapstatus (1M) Manpage**” on page 246 for details of the **icapstatus** command and its output.

Sample Session of **icapstatus** (on HP-UX)

```
/usr/sbin/icapstatus
Software version: B.08.00.01
System ID: supericod
Serial number: 1234567890
Product number: A6912A
Unique ID: fffff-fff-fffff-ffff
System contact e-mail: mjones@corp.com
From e-mail: Set to the default ('adm')
Asset reporting: on
Temporary capacity warning period: 15 days
Exception status: No exception

Local nPartition Status
-----
Total number of configured cores: 8
Number of Intended Active cores: 7
Number of active cores: 6
Number of inactive cores: 2
Additional cores that can be assigned with current usage rights: 1
Number of cores that could be assigned with additional usage rights: 1
Number of cores that can be assigned with temporary capacity: 0
Number of cores that are deconfigured or attached to inactive cells: 0

Instant Capacity Resource Summary
-----
Number of cells without usage rights: 0
Number of inactive cells: 0
Amount of memory without usage rights: 0.0 GB
Amount of inactive memory: 0.0 GB
Number of cores without usage rights: 4
Number of inactive cores: 6
Number of cores that must be deactivated (insufficient usage rights): 0
Temporary capacity available: 0 days, 0 hours, 0 minutes

Allocation of Instant Capacity Resources among the nPartitions
-----
          Intended Actual
          Total Active Active ======Inactive===== Runs
nPar ID Cores Cores Cores Cores Memory Cells iCAP nPar Name
===== ===== ===== ===== ===== ===== ===== ===== ===== =====
0      0     8     5     4     4     0.0 GB    0 Yes  Partition 0
1      1     8     7     6     2     0.0 GB    0 Yes  Partition 1 (local)
N/A   N/A   N/A   N/A   N/A   0.0 GB    0 N/A  Unassigned Cells
```

Setting System-Contact Information

It is recommended that you specify a system-contact's e-mail address on each partition in your system. On OpenVMS systems, the e-mail address may be a logical pointing to a distribution list.

If specified, the system-contact receives the following types of Instant Capacity e-mail:

- Configuration change notification when cores are activated or deactivated
- Compliance exception notification
- Temporary capacity expiration notification
- Temporary capacity enforcement notification
- Virtual partition boot time compliance notification
- If participating in a GiCAP group and a hardware incompatibility is detected (see "Upgrades and Global Instant Capacity" on page 136)

NOTE

Instant Capacity e-mail messages are sent to the system-contact e-mail address, if specified, and the root account on the partition. Most notifications are also written to the system log.

To specify the Instant Capacity system-contact's e-mail address, use the `icapmodify` command with the `-c` option. Note that you must specify a valid internet e-mail address.

Here is an example session of `icapmodify -c`:

Example 4-1**Setting the System-Contact's E-mail Address (HP-UX)**

```
/usr/sbin/icapmodify -c mjones@corp.com
```

The contact e-mail address has been set to `mjones@corp.com`.

Using Instant Capacity to Manage Processing Capacity

Setting System-Contact Information

NOTE

The e-mail address specified for the system-contact can be an e-mail alias if you desire multiple recipients to receive Instant Capacity e-mail messages.

Applying a Right To Use (RTU) Codeword

IMPORTANT

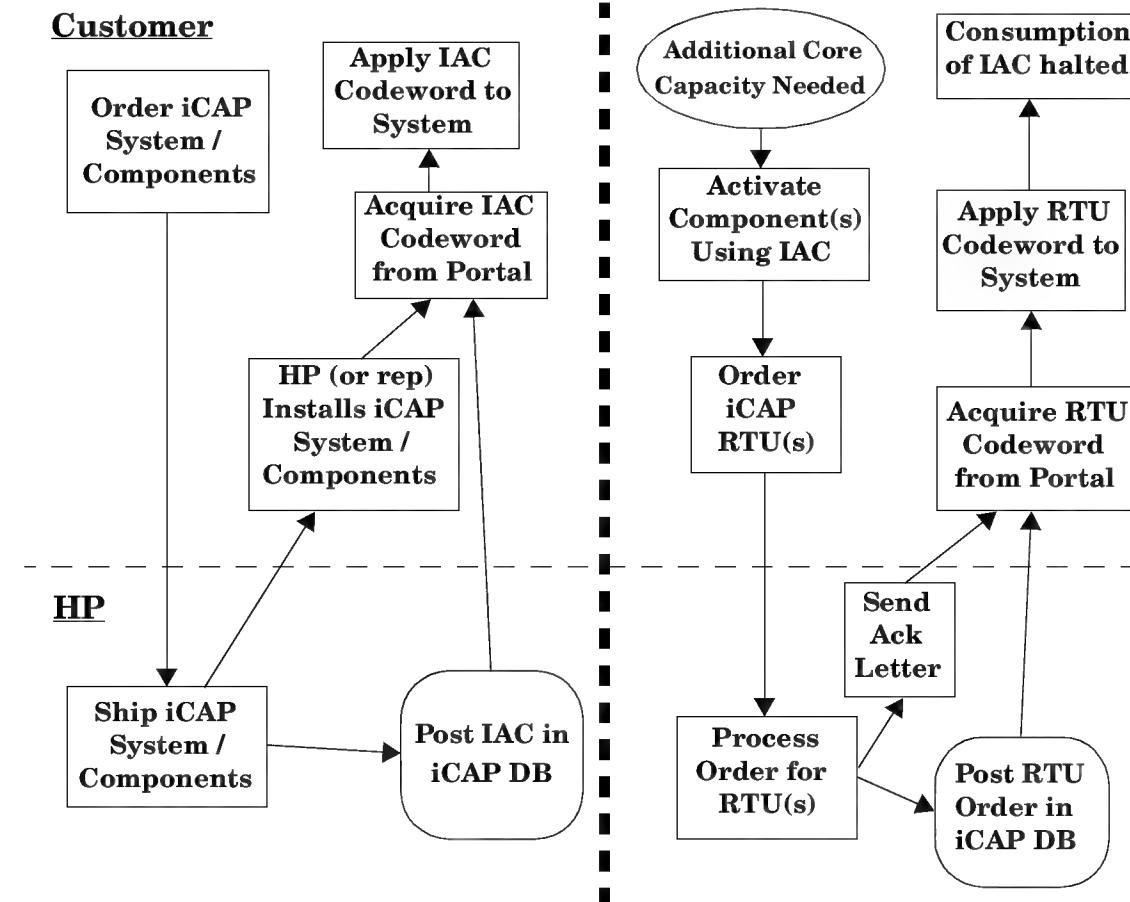
RTU codewords are based on both the serial number of a system and a unique sequencing value for that server. These codewords must be applied in the sequence in which they are obtained for a particular server. They can be applied to any partition on the server.

Using Instant Capacity to Manage Processing Capacity
Applying a Right To Use (RTU) Codeword

The following diagram illustrates the process of ordering iCAP components and ordering and applying usage rights.

Figure 4-1

Permanent Activation of Instant Capacity Components



Unless you have a balance of Instant Access Capacity or temporary capacity, additional usage rights must be acquired prior to activation of an inactive core. To purchase additional usage rights:

Step 1. Contact your HP sales representative to purchase the appropriate Instant Capacity Right to Use (RTU) product(s).

Using Instant Capacity to Manage Processing Capacity
Applying a Right To Use (RTU) Codeword

Step 2. Acquire a Right to Use (RTU) codeword from the Utility Pricing Solutions web portal (located at <http://www.hp.com/go/icap/portal>).

Step 3. Apply the RTU codeword using the `icapmodify` command with the `-C` option. Note that the `-C` option is in uppercase.

Here is an example session of applying a core RTU codeword using `icapmodify -C`:

Example 4-2

Applying a RTU Codeword (HP-UX)

```
/usr/sbin/icapmodify -C  
mDwvj0M.fbHhKC9.byrgc8k.Pc7PjMt-1cp63H9.29xrDLU.g2CJhQM.  
RzuYyd6
```

The following valid codeword has been applied to the complex:

```
Right to Use Codeword  
1 Cores
```

Use `icapstatus(1M)` to see the results of the application of this codeword.

NOTE: Application of Right to Use codewords does not result in the activation of components. Use `icapstatus(1M)` to see the results of the application of this codeword.

For cores: Use `icapmodify(1M)` to activate the cores.

For cell boards and memory: Use `parmodify(1M)` to activate cells by setting the `use_on_next_boot` flag to 'y' or use `parmgr(1M)`.

NOTE

The application of the codeword increments the count of Additional cores that can be activated with current usage rights (limited by the Number of inactive cores) in the output of the `icapstatus` command.

Activating Cores

The `icapmodify` command provides the ability to increase processing capacity instantly by activating cores with available usage rights in nPartitions (hard partitions) of Instant Capacity systems. At any time, any number of inactive cores with usage rights can be activated, as long as sufficient usage rights are available. See “Instant Capacity Integration with Virtual Partitions (HP-UX only)” on page 172 for details about activation in virtual partitions.

Activating Cores in nPartitions

The software provides two types of activation:

- *Instant* (`icapmodify` command’s default behavior) — the activation occurs immediately
- *Deferred* (`icapmodify` command’s `-D` option) — the activation occurs after the next reboot of the partition

Instant activation of cores occurs when the `icapmodify` command is used with either the `-a` or `-s` option, and the `-D` option is not specified.

Deferred activation of cores occurs when the `icapmodify` command is used with both the `-D` option and either the `-a` or `-s` option specified. With the deferred option (`-D`), core activation occurs after a reboot of the partition. The scheduled timing of the reboot (and the core activation) can take place at a planned time. For example, if you activate cores in deferred activation mode and schedule a partition reboot to occur on the first day of the next month, the cores are activated at that time.

IMPORTANT

If you shut down a partition for 24 hours or more, you should also power it off to avoid additional charges. To power off the partition, execute the `PE` command from the system MP.

On HP-UX systems, always use the `shutdown` command when shutting down or rebooting an Instant Capacity partition. See the HP-UX `manpage shutdown (1M)` for information on the `shutdown` command.

On OpenVMS systems, always use the `sys$system:shutdown.com` procedure when shutting down or rebooting an Instant Capacity partition.

IMPORTANT

On OpenVMS iCAP systems, HP strongly recommends that you activate cores using the `icapmodify` or the `ICAP SET` command. The use of the `START CPU` command on an iCAP system may result in unintended consequences, such as a reduction of available temporary capacity. Another unintended side effect may be the adjustment in core usage across the complex depending on the intended core settings on the partition where the `START CPU` command was issued.

Deferred activation does change the quantity of activated and inactivated processing capacity, even if the partition reboot has not yet occurred. Compliance checking is calculated as if the activation had not been deferred.

To activate one or more inactive cores, use the `icapmodify` command as root. See the HP-UX manpage *icapmodify(1M)* for details.

Constraints

The Instant Capacity software will not activate a core that is marked for deconfiguration. Also, you cannot use Instant Capacity to activate more cores than are configured in the current nPartition. If you want more, you need to modify the nPartition with the `parmodify` command. You can use Instant Capacity to activate more cores than are configured into the current virtual partition, but only if the associated nPartition contains enough unassigned cores to fulfill the request. Otherwise, you need to use `parmodify` to reconfigure the nPartitions, or `vparmodify` to remove cores from other virtual partitions within the same nPartition (essentially, adding to the unassigned pool).

Instant Capacity Activation Example Session

The following example shows you how to activate an additional core. At the beginning of this activation session, there are a total of 4 cores in the partition; 2 cores are activated and 2 are inactive, but usage rights have been acquired to activate at least one inactive core. In this example, 1 additional core is activated, leaving the partition with 3 active cores and 1 inactive core:

Example 4-3

Activating an Additional Core (HP-UX)

```
/usr/sbin/icapmodify -a 1 "Add CPU for new FY: Bill P."  
3 cores are intended to be active and are currently active.
```

Points of interest in the above activation example are:

- The core activation is instant (that is, a reboot is not required).
- The double-quoted text serves as an audit trail of why the activation was done and who performed it. This information is optional and is written to the Instant Capacity log file (var/adm/icap.log) if provided.

NOTE

To defer the activation until the next reboot, add the **-D** option to the command. See the HP-UX manpage *icapmodify(1M)* for details.

The **icapmodify** command allows you to activate additional cores with the **-a** option, or set the total number of active cores with the **-s** option. For example, the **icapmodify** command/option **-a 2** activates two additional cores in a partition. The **icapmodify** command/option **-s 2** sets the total number of active cores in a partition to 2.

See “Software Application Considerations” on page 79 for details of software application implications when activating additional cores.

Deactivating Cores

Deactivating Cores in nPartitions

You have the ability to decrease processing capacity instantly on HP enterprise servers with the Instant Capacity software (even on servers with sufficient usage rights such that all cores can be simultaneously active). Any number of active cores can be deactivated at any time, within the partition constraints listed below. Core deactivation can be useful for load balancing cores in nPartitions (hard partitions) of Instant Capacity systems. See “Instant Capacity Integration with Virtual Partitions (HP-UX only)” on page 172 for details about deactivating cores in virtual partitions.

The software provides two types of core deactivation:

- *Instant* (`icapmodify` command’s default behavior) — the deactivation occurs immediately
- *Deferred* (`icapmodify` command’s `-D` option) — the deactivation occurs after the next reboot of the partition

Instant deactivation of cores occurs when the `icapmodify` command is used with the `-d` option, and the `-D` option is not specified.

IMPORTANT

On OpenVMS iCAP systems, HP strongly recommends that you deactivate cores using the `icapmodify` or the `ICAP SET` command. The use of the `STOP CPU` command on an iCAP system may result in unintended consequences, such as a reactivation of the core when an Instant Capacity reconciliation transaction is requested.

Deferred deactivation of cores occurs when the `icapmodify` command is used with both the `-D` and `-d` options specified. With the deferred option (`-D`), core deactivation occurs after a reboot of the partition. The scheduled timing of the reboot (and the core deactivation) can take place at a planned time. For example, if you deactivate cores in deferred activation mode and schedule a partition reboot to occur on the first day of the next month, the cores are deactivated at that time.

To deactivate one or more active cores, use the `icapmodify` command as root. See the HP-UX manpage `icapmodify(1M)` for details.

Using Instant Capacity to Manage Processing Capacity

Deactivating Cores

Partition Constraints	An nPartition must have a minimum of one active core for each active cell. Deactivation of cores is limited by this rule. If the deactivation applies to a virtual partition, additional constraints may apply, such as the minimum number of cores specified for the virtual partition.
------------------------------	--

Deactivation Example Session for Hardware-partitionable Systems

The following example shows you how to deactivate an active core. At the beginning of this deactivation session, there are a total of 4 cores in the partition; 3 cores are active and 1 is inactive. In this example, 1 active core is deactivated, leaving the partition with 2 active cores and 2 inactive cores. As with activation, you do not specify a particular core to be deactivated. You specify only a number of cores to be deactivated.

Example 4-4

Deactivating an Active Core (HP-UX)

```
/usr/sbin/icapmodify -d 1  
2 cores are intended to be active and are currently active.
```

NOTE

In the above deactivation example, the core deactivation is instant (that is, does not require a reboot). To defer the deactivation (until the next reboot) add the **-D** option to the command. See the HP-UX manpage *icapmodify(1M)* for details.

The **icapmodify** command allows you to deactivate cores with the **-d** option, or set the total number of active cores with the **-s** option. For example, the **icapmodify -d 1** command/option deactivates 1 additional core in a partition. The **icapmodify -s 2** command/option sets the total number of active cores in a partition to 2.

Overriding Deferred Activations and Deactivations

NOTE

Only activation of cores is discussed in this section, but the discussion applies equally to the deactivation of cores.

If you have performed a deferred core activation, using the **-D** option in the **icapmodify** command, and the intended number of active cores specified is no longer desirable, you can override the (pending) deferred activation by performing another deferred or instant **icapmodify** operation. This second operation overrides the first activation.

You may experience one of the following deferred activation scenarios:

- The deferred number of active cores was incorrect and you want it to be correct when the system reboots
- The entire deferred operation was accidental and you want to undo it

The following two examples explain how to override these situations.

Example 4-5

Correcting an Incorrect Number of Deferred Active Cores (HP-UX)

1. On your system or partition you currently have 2 cores activated and 2 cores inactive. You decide 4 active cores are needed, so you perform a deferred activation for 2 additional active cores by entering the following command:

/usr/sbin/icapmodify -D -a 2

2. Later, and prior to a system reboot, you realize that you need only 3 active cores (not 4). You can override the initial deferred activation in **Step 1** by entering the following command:

/usr/sbin/icapmodify -D -s 3

The **-s** option in **Step 2** (above) sets the number of active cores. The activation takes place after the next system reboot due to the **-D** option. You could also perform **Step 2** without the **-D** option for the **icapmodify** operation to be instant.

Using Instant Capacity to Manage Processing Capacity
Overriding Deferred Activations and Deactivations

Example 4-6

Undoing an Accidental Deferred Activation (HP-UX)

1. On your system or partition you currently have 2 cores activated and 2 cores inactive. You accidentally perform a deferred activation for 1 additional active core by entering the following command:

`/usr/sbin/icapmodify -D -a 1`

2. Later, and prior to a system reboot, you realize that you didn't want to activate the additional core — which would give you 3 active cores — and you want your number of active cores to be 2. You can override the initial deferred activation in **Step 1** by entering the following command:

`/usr/sbin/icapmodify -a 0`

The `-a 0` option in **Step 2** (above) overrides the previous (deferred) `icapmodify` command, which was executed in **Step 1**. The `-a` option is relative to the number of active cores (not the intended number of active cores).

You could accomplish the same result as **Step 2** with the following command:

`/usr/sbin/icapmodify -s 2`

Load-Balancing Active Cores

Active cores can be redistributed across any or all partitions of a hardware-partitionable system if those partitions contain inactive cores.

For example, consider a system with two partitions:

Partition 1 has 5 active cores and 3 inactive cores

Partition 2 has 8 active cores and 0 inactive cores

You need to add processing power to Partition 1 because of application demand and you notice that the active cores in Partition 2 are under-utilized.

Deactivating an active core in Partition 2 decreases the number of active cores in that partition, and activating one of the cores in Partition 1 increases the number of active cores in that partition. The total number of active cores in the complex is the same at the end of this operation.

IMPORTANT

To remain in compliance, it is important to perform the deactivation operation first.

This leaves the following:

Partition 1 now has 6 active cores and 2 inactive cores

Partition 2 now has 7 active cores and 1 inactive core

Does the redistribution of active cores affect compliance?

No, because you did not change the overall number of active cores in the complex. If it was in compliance prior to the redistribution, it remains in compliance. You should ensure that you have proper licensing for all HP and third party software when performing load balancing.

Assigning a Cell to a Partition

A cell can be assigned to a partition only if there are sufficient cell usage rights available across the complex, as well as sufficient memory usage rights to enable activation of all the memory on the cell, and sufficient usage rights for at least one core of the cell to be active.

When a cell is assigned to a partition in an Instant Capacity system, depending on the number of core usage rights available in the system when the cell is assigned, the number of intended active cores for the partition automatically changes. The following example of a single partition with one assigned and one unassigned cell illustrates this:

Table 4-1

Partition pre-modification state: One cell assigned with 3 active and 1 inactive cores, and available usage rights for 2 additional cores

Cell 1	Available Core Usage Rights	
A A A I	UR	UR

Table 4-2

Pre-modification state: Unassigned cell with 4 unused cores

Cell 2
U U U U

Table 4-3

Partition post-modification state: Cell 2 assigned to partition

Cell 1	Cell 2
A A A I	A A I I

When Cell 2 is assigned to the partition, the number of intended active cores for the partition is automatically changed to 5. When the partition is rebooted, 5 cores in the partition are activated.

Using Instant Capacity to Manage Processing Capacity
Assigning a Cell to a Partition

In general, when an unassigned cell is assigned to a partition, the Instant Capacity software determines the number of available core usage rights in the complex and will use this number to activate as many cores as possible in the new cell. (This number will typically correspond to the `icapstatus` value for `Additional cores` that can be activated with current usage rights. This value must be nonzero in order to be able to assign an inactive cell to a partition.)

NOTE

Cell boards are assigned to specific partitions and cannot be shared between partitions. All cores on a cell board are accessible only by the partition to which the cell board is assigned. Cores on one cell board cannot be shared across multiple partitions.

Unassigning a Cell from a Partition

When a cell is unassigned from a partition in a system with Instant Capacity, the number of intended active cores in the partition decreases only if the number of cores being removed with the cell is greater than the number of expected inactive cores in the partition. In the following example of a single partition system with 3 cells, the number of intended active cores remains the same because the number of cores with the removed cell (4) does not exceed the total number of expected inactive cores in the partition (6).

Table 4-4

Partition pre-modification state: Three cells with 2 active and 2 inactive cores in each (total of 6 active cores)

Cell 1	Cell 2	Cell 3
A A I I	A A I I	A A I I

Table 4-5

Partition post-modification state: Cell 3 is unassigned (total of 6 active remains)

Cell 1	Cell 2
A A A I	A A A I

Table 4-6

Partition post-modification state: Unassigned cell (Cell 3) with 4 inactive cores

Cell 3
I I I I

When Cell 3 is unassigned from the partition, the number of intended active cores for the partition remains at 6. When the partition is rebooted, a total of 6 cores are activated. Cell 3 becomes an unassigned cell with 4 inactive cores, essentially freeing up usage rights which are distributed among the remaining cells.

Using Instant Capacity to Manage Processing Capacity
Unassigning a Cell from a Partition

In the next example of unassigning a cell from a partition, the number of cores removed (4) is greater than the number of expected inactive cores in the partition (3). When this happens, the number of intended active cores is automatically set to the total number of remaining cores in the partition (8).

Table 4-7

Partition pre-modification state: Three cells with 3 active and 1 inactive cores in each (total of 9 active cores)

Cell 1	Cell 2	Cell 3
A A A I	A A A I	A A A I

Table 4-8

Partition post-modification state: Cell 3 is unassigned (total of 8 active is set)

Cell 1	Cell 2
A A A A	A A A A

Table 4-9

Post-modification state: Unassigned cell (Cell 3) with 4 inactive cores. The system has usage rights available for one additional core.

Cell 3	Available Usage Rights
I I I I	UR

When Cell 3 is unassigned from the partition, the number of intended active cores is changed from 9 to 8 (because 8 is the total number of cores remaining in the partition). When the partition is rebooted, a total of 8 cores are activated. Cell 3 becomes an unassigned cell with 4 inactive cores and there are (unused) usage rights available for one additional core for the complex.

Using Instant Capacity to Manage Processing Capacity

Unassigning a Cell from a Partition

NOTE

If your intent is to migrate a cell from one partition to another, you can control the number of cores available to the cell by deactivating cores in the partition you removed the cell from. By deactivating cores, you are freeing up core usage rights for the entire complex.

Software Application Considerations

Some software applications size themselves based on the number of available cores when the application is started. If an application is running when an additional core is activated, it may not recognize the newly activated core as available for processing. Therefore, it may be necessary to do one of the following for optimal performance with this type of application:

- Restart the application in order for it to recognize the presence of newly activated cores
- Reconfigure the application, prior to it being restarted, for maximum performance benefits of the newly activated core
- Use the deferred activation option when activating cores so that processors are only activated in conjunction with system reboots - see the HP-UX manpage *icapmodify(1M)* for details

IMPORTANT

When you activate a core, the number of active cores in the system increases. Consequently this may require a license upgrade for some of the software from HP or third party vendors on your system. A license may be required for software from other application providers.

Test Activation of Cores Using Temporary Capacity

You may want to test your software application for proper operation and improved performance by activating an additional core. The use of temporary capacity (TiCAP) or Instant Access Capacity (IAC) is required for activation of a core without usage rights for testing purposes. See Chapter 5, “Temporary Instant Capacity,” on page 83 for details.

The following testing guidelines are meant to be an aid to your test plan. You may need to get consulting help to develop a detailed test plan.

1. Test your applications for proper functionality and performance first by testing with the number of inactive cores equal to the number of cores without usage rights. (The system should already be configured this way.) Be sure to check measurement tools that monitor core usage.
2. Acquire temporary capacity for the necessary amount of core test activation.
3. Use temporary capacity to activate one or more inactive cores to be used while your applications are running.
4. Confirm that measurement tools, which monitor processing usage, account for the newly activated core(s).
5. Verify that applications are benefiting from the performance of the extra cores (as per your expectations for your applications). Note: some applications may need to be restarted or reconfigured to take advantage of the newly activated cores.
6. When you are finished with your testing, deactivate cores until the number of inactive cores again matches the number of cores without usage rights, thereby stopping the usage of temporary capacity.
7. Use `icapstatus` to verify that no cores are consuming temporary capacity.

Replacement of Failed Cores

HP-UX LPMC and HPMC

If an active core fails with a Low Priority Machine Check (LPMC) in a partition with Instant Capacity, its processing capacity is replaced instantly by an inactive core, if any are available in the partition. The failed core is marked for deconfiguration during the next system reboot.

See “LPMC Deactivations in Virtual Partitions” on page 181 for additional considerations in a virtual partition environment.

If an active core fails with a High Priority Machine Check (HPMC), then upon reboot, the failed core is deconfigured and its processing capacity is instantly replaced by an inactive core, if any are available in the partition.

NOTE	In both of the above scenarios, you should replace the failed core in a timely manner using your normal hardware support process.
-------------	---

Failed Monarch Processors (HP-UX only)

Monarch processors (see page 264 for a definition) that are failing with a LPMC are not instantly replaced. When a monarch processor experiences a LPMC, the LPMC monitor marks the processor for deconfiguration; however, the LPMC monitor cannot deactivate the processor, unless the system is rebooted. Deactivation of a monarch processor is not possible because it is the controlling processor of the operating system (CPU 0). Therefore, Instant Capacity cannot replace a (failing) monarch processor.

If your system has only one active processor, it is considered a monarch processor, and it cannot be replaced online. A reboot of the system is required to replace the failing monarch processor.

If there are multiple active processors in your system, one of them is designated as the monarch processor, and the other (non-monarch) processors can be replaced online. If the monarch processor fails, it cannot be replaced without a reboot.

Replacement of Failed Cores on OpenVMS

If a core is experiencing correctable errors, it should be shut down and another iCAP core started up, thereby keeping the active core count constant.

If a core experiences a fatal problem leading to a system crash, upon reboot another iCAP core can be started thereby replacing the failed core and keeping the active core count constant.

Failed OpenVMS Primary Processors

An OpenVMS primary processor that is failing cannot be instantly replaced.

If your system has only one active processor, it is considered a primary processor and it cannot be replaced online. A reboot of the system is required to replace the failing primary processor.

If there are multiple active processors in your system, one of them is designated as the primary processor and the other (non-primary) processors can be replaced online. If the primary processor fails, it cannot be replaced without a reboot.

This chapter covers the following topics:

- “Temporary Instant Capacity Overview” on page 84
- “Ordering Temporary Instant Capacity” on page 86
- “Using Temporary Instant Capacity” on page 87
- “Tracking the Usage of Temporary Instant Capacity” on page 90
- “Temporary Instant Capacity Warning Period” on page 93
- “Temporary Instant Capacity Expiration and Compliance Enforcement” on page 94
- “Temporary Instant Capacity Exceptions” on page 96

Temporary Instant Capacity

Temporary Instant Capacity Overview

Temporary Instant Capacity Overview

You can purchase an amount of temporary capacity (TiCAP) time for inactive cores without usage rights in your Instant Capacity system. Temporary capacity can be purchased in units of multiple processing-days. Temporary capacity allows one or more inactive cores to be activated for up to the specified period of pre-paid processing minutes, without requiring permanent usage rights for the core(s).

You can activate and deactivate inactive cores as you wish until the elapsed activation time equals your prepaid temporary capacity duration. For example, with a prepaid duration of 30 days of temporary capacity, you can activate one core for 30 days or four cores for one hour a day for 180 days (or any combination that totals 43,200 minutes).

Temporary capacity activations are persistent. That is, activations using temporary capacity survive in a partition that is rebooted. You must deactivate cores to stop consumption of temporary capacity. The cores deactivated need not be on the same partition as those you activated to start consuming temporary capacity.

NOTE

Temporary capacity credits may be used on any partition in the complex for which they were purchased. Temporary capacity credits are not transferable from one system to another, unless the systems are in the same Global Instant Capacity group.

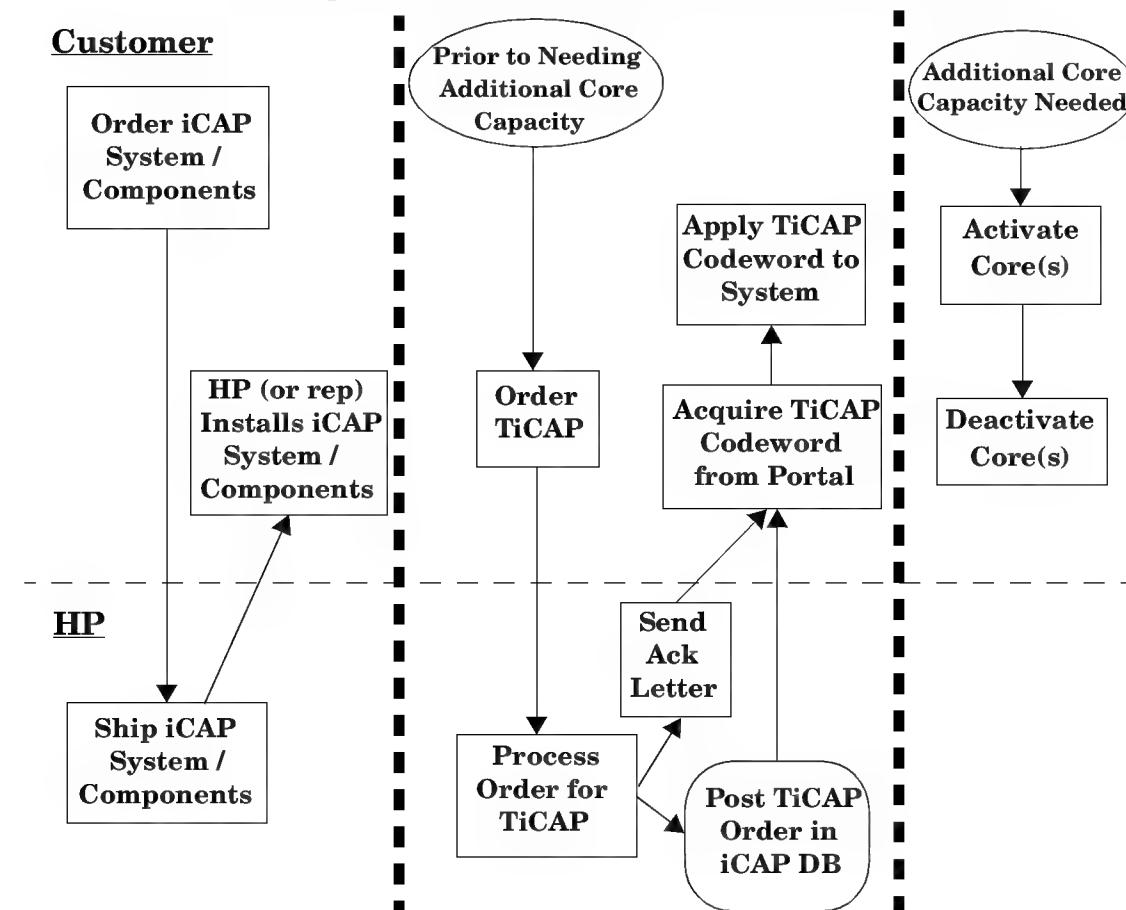
If temporary capacity is depleted and you continue to have more active cores than core usage rights across the complex, on the next reboot of any partition in the complex the software will automatically deactivate one or more cores in order to bring the system into a state closer to compliance. The Instant Capacity software will deactivate as many cores as is necessary to either stop consumption of temporary capacity or to bring the partition to the minimum number of required active cores (one per active cell board).

IMPORTANT

Temporary Instant Capacity can only be used to activate Instant Capacity cores on a temporary basis. It cannot be used to activate Instant Capacity cell boards or Instant Capacity memory.

Figure 5-1

Using Temporary Instant Capacity: Rapid Activation of Components



Ordering Temporary Instant Capacity

To add temporary capacity credits to a system, order the desired quantity of the temporary capacity product for your type of server. The system serial number is required for orders of temporary capacity.

Note that Instant Capacity cores that are added on to an existing system may include some additional temporary capacity called Instant Access Capacity (IAC). Over time, the IAC may be consumed and you may want to also order additional temporary capacity in order to continue activating cores on a temporary basis. Temporary capacity is purchased in units of processing-days, each of which can be used to activate a single core for a 24 hours (either continuously or spread over several days), or multiple cores for portions that add up to a single day. Then, you must also follow the configuration procedures (see “Acquiring and Configuring Temporary Instant Capacity” on page 87) for each partition.

HP-UX Licensing and Support with Temporary Instant Capacity

When you purchase temporary capacity, the temporary HP-UX license-to-use is included when Instant Capacity cores are activated using temporary capacity. Software licenses for third-party software may be needed. Check with your application software vendor for licensing requirements. Since licensing may change without notice, you should check your contract to understand the details of software licensing with temporary capacity.

OpenVMS Licensing and Support with Temporary Instant Capacity

When you purchase temporary capacity, the temporary OpenVMS license-to-use is included when Instant Capacity cores are activated using temporary capacity. The OpenVMS license management facility will recognize when Temporary Instant Capacity cores are activated and treat the usage as compliant. For third party software that uses per-core licensing, check with the vendor for licensing requirements.

Using Temporary Instant Capacity

Acquiring and Configuring Temporary Instant Capacity

To add temporary capacity to a system that contains Instant Capacity cores (cores without usage rights), follow this procedure:

Step 1. Order the desired amount of temporary capacity for your type of server by submitting a purchase order to HP. You must specify the system serial number.

After you purchase an amount of temporary capacity, HP sends you a letter that contains details on how to acquire a temporary capacity codeword and apply it to the system.

Step 2. Acquire the temporary capacity codeword from the Utility Pricing Solutions portal (<http://www.hp.com/go/icap/portal>)

Step 3. Apply the temporary capacity codeword using the `icapmodify -C` command:

Example 5-1 Applying a Temporary Capacity Codeword (HP-UX)

```
/usr/sbin/icapmodify -C vnyqD.qjieC7e.LaLdQGH.4aCNYBp-BQk3w9n.jfDhpvz.LiEB58C.7Q3dca2
```

The following valid codeword has been applied to the complex:

```
Temporary Capacity Codeword
30 days 0 hours 0 minutes
```

Use `icapstatus(1M)` to see the results of the application of this codeword.

NOTE

iCAP codewords are based on both the serial number of a system and a unique sequencing value for that server. These codewords must be applied in the sequence in which they are obtained for a particular server. They can be applied to any partition on the server.

Temporary Instant Capacity

Using Temporary Instant Capacity

Step 4. Optional: if you wish to view temporary capacity balances on the portal, configure your partition for e-mail connectivity to HP. See “Configuring E-Mail on Instant Capacity Systems” on page 184 for details.

Utilizing Temporary Instant Capacity

Auditing of temporary capacity is done at the complex level on Instant Capacity systems that support partitioning.

To use temporary capacity in a system that contains Instant Capacity cores, and has had the temporary capacity RTU codeword applied, follow this procedure:

To activate one or more cores in an nPartition, and allow them to use temporary capacity, use the `icapmodify -t -a <number>` command/options.

In the following activation example, two cores are currently active in the partition. You desire to activate a third core, but there are no available usage rights for activation. Because temporary capacity is available on the system, you can activate a third core with it.

Example 5-2

Activating an Instant Capacity Core with Temporary Capacity (HP-UX)

```
/usr/sbin/icapmodify -t -a 1
```

3 cores are intended to be active and are currently active.

```
Number of cores using temporary capacity: 1  
Projected temporary capacity expiration: 7/22/06 08:00:00
```

NOTE

Temporary capacity cannot be used to activate Instant Capacity cores in inactive Instant Capacity cell boards. Additional usage rights must be purchased for the cell board, and perhaps also for the memory of the cell board.

When you want to decrease or stop using temporary capacity, you deactivate the appropriate number of cores. Note: you do not use the “-t” option when deactivating cores. Temporary capacity will no longer be used when the number of active cores is equal to or less than the number of cores with usage rights, across the complex.

Temporary Instant Capacity
Using Temporary Instant Capacity

To deactivate one or more cores in an nPartition, use the `icapmodify -d <number>` command.

Temporary Instant Capacity

Tracking the Usage of Temporary Instant Capacity

Tracking the Usage of Temporary Instant Capacity

The `icapstatus` command provides the following temporary capacity information:

- Amount of temporary capacity remaining (in days, hours, and minutes)
- Number of cores using temporary capacity — this is the number of active cores without usage rights
- Projected temporary capacity expiration date and time — this is based on the current temporary capacity consumption rate

You can find this information in the Instant Capacity Resource Summary section from the `icapstatus` command's output.

Here is an example of temporary capacity information, from the Instant Capacity Resource Summary section of the `icapstatus` command's output:

Example 5-3

Viewing Temporary Capacity Information from `icapstatus` Command Output (HP-UX)

`/usr/sbin/icapstatus`

Instant Capacity Resource Summary

Number of cells without usage rights:	0
Number of inactive cells:	0
Amount of memory without usage rights:	0.0 GB
Amount of inactive memory:	0.0 GB
Number of cores without usage rights:	4
Number of inactive cores:	3
Number of cores that must be deactivated (insufficient usage rights):	1
Temporary capacity available:	10 days, 1 hours, 40 minutes

**Temporary
Capacity
Expiration
Reminder**

The Instant Capacity software calculates when the temporary capacity balance will expire, based on the current consumption rate. After the temporary capacity balance reaches a certain residual number of days (see “Temporary Instant Capacity Warning Period” on page 93), a reminder e-mail message is automatically sent to the system-contact, if one is specified, and root. These messages will be sent on a daily basis until temporary capacity has expired. Here is an example of a temporary capacity expiration reminder e-mail message:

Example 5-4

Temporary Capacity Expiration Reminder

To: root@par1.yourorg.com
Subject: Temporary Capacity Expiration Reminder

```
*****
**** Failure to perform the following steps will result in the complex ****
**** attempting to deactivate cores on any booting partitions until ****
**** the complex is in compliance with the Instant Capacity contract. ****
*****
```

This message is being sent to remind you that your Instant Capacity complex (containing the partition krmt10b) has 3 cores currently consuming temporary capacity (TiCAP) and that the temporary capacity balance at the current consumption rate is projected to expire on or around:

05/31/05 16:00:00

You can view the current temporary capacity balance and consumption rate, by using the `icapstatus` command.

To adjust the number of calendar days to receive the temporary capacity warning before temporary capacity actually expires use: `icapmodify -w`

Before the temporary capacity balance runs out, you must perform one of the following steps:

1. Purchase additional temporary capacity and apply the temporary capacity codeword to the complex.
2. Deactivate cores until the number of inactive cores on the complex matches the number of cores without usage rights, reported by `icapstatus`.
3. Purchase additional core usage rights to match the number of cores currently consuming temporary, and apply the Right to Use codewords to the complex so that they can be permanently activated.

Temporary Instant Capacity

Tracking the Usage of Temporary Instant Capacity

See the Instant Capacity User's Guide at `/usr/share/doc/icapUserGuide.pdf` for more information.

Also note that the output from `icapstatus` during the warning period includes a warning about the expiration of temporary capacity.

Temporary Instant Capacity Warning Period

By default, the Instant Capacity software will send the expiration reminder when the temporary capacity balance is projected to expire within 15 days or less. You can adjust that warning period by specifying a different value with the `icapmodify` command, using the `-w` option. For example, this command specifies a longer warning period, for more advance notice:

```
icapmodify -w 20
```

The Temporary Capacity Warning Period has been successfully set to 20 days.

Temporary Instant Capacity Expiration and Compliance Enforcement

IMPORTANT

If you leave cores without usage rights activated beyond the purchased temporary capacity duration, the software will *automatically* deactivate one or more cores on the next reboot of any partition in the complex.

When you leave cores without usage rights activated on OpenVMS systems, the `ICAP_SERVER` will automatically deactivate one or more cores within one half hour on any partition in the complex.

After the temporary capacity is depleted, and you continue to have more active cores than usage rights across the complex, a notice appears at the bottom of the `icapstatus` output similar to the following:

WARNING: Temporary capacity has expired and this complex is out of compliance with the Instant Capacity contract because there are 2 more active cores than there are core usage rights.
Deactivation of cores may occur during partition reboot to bring the complex into compliance. In order to avoid the deactivation of cores upon reboot, you need to take corrective action immediately. Either deactivate 2 core(s), apply additional temporary capacity codewords, or purchase and apply Right to Use codewords for 2 core(s).

As stated in the warning, if cores without usage rights continue to be used, then on the next reboot of any partition in the complex, the software will automatically deactivate one or more cores in order to bring the system into a state closer to compliance. The Instant Capacity software will deactivate as many cores as is necessary to either stop consumption of temporary capacity or to bring the partition to the minimum number of required active cores. You must purchase additional temporary capacity or purchase the appropriate number of usage rights (RTU codewords) to be in full compliance.

See “Temporary Instant Capacity Exceptions” on page 96 for examples of the error messages that are sent as a result of compliance enforcement.

Temporary Instant Capacity

Temporary Instant Capacity Expiration and Compliance Enforcement

Auditing of temporary capacity is done at the complex (node) level on Instant Capacity systems that support partitioning. While temporary capacity may have been purchased for use by a specific partition, it is available to all partitions in the complex or node.

Purchasing the appropriate RTU product that provides additional core usage rights for the system and applying the associated RTU codeword clears out any previous violation of Temporary Instant Capacity.

Temporary Instant Capacity

Temporary Instant Capacity Exceptions

Temporary Instant Capacity Exceptions

Error for Activation with Insufficient Temporary Capacity

You cannot activate an Instant Capacity core with temporary capacity unless there is a sufficient balance of temporary capacity on the system. To increase the temporary capacity balance, see “Acquiring and Configuring Temporary Instant Capacity” on page 87 for details.

Here is an example of the error message for attempting to activate an inactive core without usage rights and without a sufficient temporary capacity balance:

Example 5-5

Error Message for Activation with Insufficient Temporary Capacity (HP-UX)

```
/usr/sbin/icapmodify -t -a 1
```

```
ERROR: Operation not approved because there is not enough temporary capacity
to satisfy the request. Activations require at least 30 minutes
worth of temporary capacity per core consuming temporary capacity.
```

Temporary Capacity Balance Needing Action

If the temporary capacity balance reaches 30 minutes or less, the `icapstatus` command’s output displays “less than 30 minutes” in the Exception status field (at the beginning of the `icapstatus` output). When this state occurs, you need to take corrective action immediately and do one of the following:

- Deactivate Instant Capacity cores that are utilizing temporary capacity
- Apply additional temporary capacity codewords
- Acquire additional core usage rights and apply the RTU codeword

Temporary Capacity Negative Balance

A complex is out of compliance with the Instant Capacity contract if a negative balance of temporary capacity occurs.

The Instant Capacity software sends an exception report (via e-mail) if there is a negative balance of temporary capacity. Exception information is also written to the syslog file. See “Handling Compliance Exceptions” on page 142 for details of the exception report for a negative temporary capacity balance.

If you continue to have more active cores than core usage rights across the complex, a negative capacity balance will result in a compliance enforcement action, as described in “Temporary Instant Capacity Expiration and Compliance Enforcement” on page 94. If there is a negative temporary capacity balance but the number of cores with usage rights is greater than or equal to the number of active cores, then the complex remains in an exception state, but without (additional) enforcement action.

Purchasing additional core usage rights and applying the RTU codeword to the system clears out any previous violation of Temporary Instant Capacity. Purchase of sufficient additional temporary capacity will also clear out a negative balance.

Temporary Capacity Enforcement

When the temporary capacity balance has been depleted and you continue to have more active cores than core usage rights across the complex, an enforcement action occurs on a partition reboot to bring the system into a state closer to compliance (by deactivating one or more cores). Example 5-6 is an example of the message that is sent when the enforcement results in a partially compliant state, but temporary capacity continues to be depleted. Example 5-7 is an example of the message that is sent when the enforcement is able to deactivate enough cores so that temporary capacity is no longer being used.

Temporary Instant Capacity

Temporary Instant Capacity Exceptions

Example 5-6 Error Message for Temporary Capacity Partial Enforcement

To: root@par1.yourorg.com
Subject: Instant Capacity enforcement notice

This message is being sent to inform you that, due to expiration of temporary capacity, 1 additional core(s) were deactivated on your Instant Capacity system (containing the partition par1) to bring the complex into compliance.

Prior to deactivation, the number of active cores exceeded the number of available core usage rights by 3. 3 core(s) without usage rights were found to be active in the complex. This state was likely the result of having activated Instant Capacity core(s) using temporary capacity (TiCAP), and then allowing the TiCAP balance to expire prior to deactivation of the core(s).

As a result, the intended active value was reduced by 1 and 1 core(s) were deactivated.

There are currently 3 active core(s) and 1 core usage rights. This complex is not in compliance with the Instant Capacity contract. Other partitions may also experience core deactivation upon reboot until compliance is restored. To bring the system back into compliance now, perform one or more of the following steps:

1. Purchase additional temporary capacity and apply the temporary capacity codeword(s) to the complex.
2. Deactivate cores until no cores are consuming temporary capacity.
3. Purchase additional usage rights to match the number of cores consuming temporary capacity and apply the Right to Use codewords to the complex so that they can be permanently activated.

To activate these 1 core(s) again, you can perform one of the following actions:

1. Purchase additional temporary capacity and apply the TiCAP codeword(s) to the complex, and use temporary capacity to activate the core(s).
2. Deactivate cores in other partitions after the complex is in compliance. This frees up core usage rights which can be used to activate cores on this partition.

You can view the current temporary capacity compliance of your system by using the `icapstatus` command.

See the Instant Capacity User's Guide at </usr/share/doc/icapUserGuide.pdf> for more information.

Temporary Instant Capacity
Temporary Instant Capacity Exceptions

Example 5-7 Error Message for Temporary Capacity Complete Enforcement

To: root@par1.yourorg.com
Subject: Instant Capacity enforcement notice

This message is being sent to inform you that, due to expiration of temporary capacity, 1 core(s) were deactivated on your Instant Capacity complex (containing the partition par1) to bring the complex into compliance with the Instant Capacity contract.

Prior to deactivation, the number of active cores exceeded the number of available usage rights by 1. 1 core(s) without usage rights were found to be active in the complex. This state was likely the result of having activated Instant Capacity core(s) using temporary capacity (TiCAP) and then allowing the temporary capacity balance to expire prior to deactivation of the core(s).

As a result, the intended active value was reduced by 1 and 1 core(s) were deactivated. To activate these 1 core(s) again, you can perform one of the following actions:

1. Purchase additional temporary capacity, apply the TiCAP codeword(s) to the complex, and use temporary capacity to activate the core(s).
2. Deactivate cores in other partitions. This frees up core usage rights which can be used to activate cores on this partition.

There are currently 3 active core(s) and 3 core usage rights. This complex is now compliant with the Instant Capacity contract.

You can view the current temporary capacity compliance of your system by using the `icapstatus` command.

See the Instant Capacity User's Guide at `/usr/share/doc/icapUserGuide.pdf` for more information.

Temporary Instant Capacity

Temporary Instant Capacity Exceptions

This chapter covers the following topics:

- “Instant Capacity Cell Board” on page 102
- “Ordering Instant Capacity Cell Board” on page 104
- “HP-UX and OpenVMS License and Support” on page 105
- “Acquisition of Usage Rights (RTU) for Instant Capacity Cell Board” on page 106
- “Instant Capacity Cell Board and Considerations of Core Usage Rights” on page 108
- “Activation of an Instant Capacity Cell Board” on page 111
- “Accidental Activation of an Instant Capacity Cell Board” on page 112
- “Instant Capacity Cell Board Activation Exception Error” on page 113
- “Instant Capacity Cell Board and Temporary Instant Capacity” on page 115

Instant Capacity Cell Board

Overview

Instant Capacity Cell Board offers you a way to have additional (inactive) cell board capacity in your system for growing business needs. When the need arises, you acquire the necessary usage rights in order to activate and use the cell boards, which contain memory and processors/cores.

An Instant Capacity cell board is configured at HP manufacturing already assigned to an nPartition (hard partition) with its use-on-next-boot flag set to "n" (no), so it does not participate in the boot of the nPartition.

When you are ready to activate a cell board, you can increase the cell usage rights by either purchasing the appropriate Right to Use (RTU) product(s), or by borrowing usage rights if you are using Global Instant Capacity to share usage rights within a group of servers. To purchase usage rights, submit a purchase order to HP for the appropriate Right to Use (RTU) product(s) to increase the cell usage rights available on the complex, as well as sufficient usage rights for all of the memory on the cell board and, depending on the available usage rights and existing complex configuration, usage rights for one or more additional cores. Then, the cell board is available for activation and participation in the boot of the nPartition. This is controlled by setting the use-on-next-boot flag to "y" (yes) with the parmodify command and rebooting the nPartition.

NOTE

If insufficient usage rights exist for the cell board, its memory, and at least one core, the Instant Capacity software prevents it from being configured to participate (become active) in the boot of an nPartition.

Any cell board, whether usage rights are available for activation or not, can be assigned to an nPartition with the use-on-next-boot flag set to "n" (no).

Because an active cell board must have a minimum of one active core, prior to activation of a cell board one of the following must be true:

Instant Capacity Cell Board
Instant Capacity Cell Board

- Usage rights for at least one additional core must be available in the complex or group if applicable. There must be at least one active core per cell board. The Instant Capacity software will redistribute active cores across all cell boards in the partition.
- Usage rights for at least one additional core must be purchased and the RTU codeword applied to the complex.
- If the complex is a member of a Global Instant Capacity (GiCAP) group, usage rights for at least one additional core must be available from the group.

After a cell board has been activated, all of the cores on the cell board are potentially activatable, depending on the availability of core usage rights. You may need to acquire additional core usage rights in order to activate additional cores from the newly activated cell board.

See “Assigning a Cell to a Partition” on page 74 and “Unassigning a Cell from a Partition” on page 76 for information on assigning and unassigning a cell board to an nPartition.

IMPORTANT

An active cell board must have a minimum of one active core.

Check with your HP sales representative for availability of the Instant Capacity Cell Board product.

Ordering Instant Capacity Cell Board

To order the Instant Capacity Cell Board product you need to do the following:

- Order the appropriate HP product number for the cell board for your specific class of HP server.
- Order the appropriate HP product number for the entire amount of Instant Capacity memory on the cell board.
- Order the appropriate HP product numbers and quantities of Instant Capacity processors for the number of additional cores to activate on the cell board (see “Instant Capacity Cell Board and Considerations of Core Usage Rights” on page 108 for more details about core usage rights).

NOTE

It is highly recommended that you have the same number of processors/cores and amount of memory on all cell boards in a given hard partition (nPartition). For optimum performance, each nPartition should have cell boards with identical numbers of processors/cores and amounts of memory (otherwise, the system performance can be unpredictable).

Rules for ordering memory ensure that the Instant Capacity cell board matches the amount of memory in the other cell boards in a given nPartition.

HP-UX and OpenVMS License and Support

You do not initially pay for HP-UX and OpenVMS license and support fees on an Instant Capacity cell board.

When you acquire the usage rights for a cell board by purchasing the Right to Use (RTU) product, you must additionally pay for the incremental HP-UX or OpenVMS license and support costs for each core that is activated. That is, the HP-UX or OpenVMS license and support costs are based on a “per active core” basis and not included as part of the cell board RTU.

If activation of an Instant Capacity cell board does not increase the number of active cores, then you do not have to pay any incremental HP-UX or OpenVMS license and support fees.

Your system must be properly licensed for the HP-UX or OpenVMS Operating Environment (OE) when activating the Instant Capacity cell board. Software licenses for third party software may also be needed. Check with your application software vendor for licensing requirements.

Acquisition of Usage Rights (RTU) for Instant Capacity Cell Board

Before activation of an (inactive) Instant Capacity cell board, you must acquire (purchase, or borrow from a GiCAP group) additional usage rights from HP. To purchase additional usage rights:

- Order the appropriate HP Right to Use (RTU) product for the cell board for your specific class of HP server.
- Order the appropriate HP Right to Use (RTU) product for the entire amount of Instant Capacity memory on the cell board.
- Order the appropriate HP Right to Use (RTU) products for the number of additional cores you want to activate on the cell board. This number will depend on several factors (and in some cases may not be required), but you should examine this before ordering *any* cell board-related usage rights. See “Instant Capacity Cell Board and Considerations of Core Usage Rights” on page 108 for more details about how to determine this number.

HP then sends you a letter that contains details on how to acquire RTU codeword(s*) for the purchased components. The letter also describes how to apply the codewords to the system to increase the usage rights on the complex. The steps are:

Step 1. Acquire the appropriate RTU codeword (cell board, memory, core*) from the Utility Pricing Solutions portal (<http://www.hp.com/go/icap/portal>)

Step 2. Apply the appropriate RTU codeword (cell board, memory, core*) using the `icapmodify -C` command

IMPORTANT

RTU codewords are based on both the serial number of a system and a unique sequencing value for that server. These codewords must be applied in the sequence in which they are obtained for a particular server. They can be applied to any partition on the server.

Instant Capacity Cell Board

Acquisition of Usage Rights (RTU) for Instant Capacity Cell Board

* Note that if multiple RTU products are purchased at one time, a single codeword may be generated that incorporates multiple usage rights for the different components.

For an alternative to purchasing usage rights, see Chapter 7 for a discussion of GiCAP and how usage rights may be borrowed from other members of a GiCAP group on HP-UX systems.

Instant Capacity Cell Board and Considerations of Core Usage Rights

There must be at least one core usage right available for an Instant Capacity cell board you wish to activate. Each active cell board must have at least one active core. However, this does not necessarily mean you must acquire additional core usage rights. No additional core usage rights are required unless the requirement of a minimum of one core per active cell board could not be met without acquiring additional core usage rights. That is, if the number of active cores in an nPartition equals (or exceeds) the number of cell usage rights, then the purchase of additional core usage rights is not necessary.

NOTE

The following examples assume that the number of Intended Active cores for the nPartition remains constant before and after the cell board activation.

Example 6-1

Cell Board Activation Not Requiring Additional Core Usage Rights

For example, consider an nPartition with one active cell board with all four cores active, and one inactive cell board with four inactive cores. The number of Intended Active cores for the nPartition is four. There are no additional core usage rights available. Activation of the inactive cell board on the complex will result in two active cores per cell board after a reboot. That is, the Instant Capacity software distributes the available core usage rights across the two active cell boards in the partition. The requirement that at least one core is active on each cell board is satisfied, so purchase of additional core usage rights is not necessary. Of course, you may wish to activate additional cores in the partition and if so, then you should purchase core usage rights at the same time as the cell usage rights, but it is not required in this situation.

Table 6-1

Cell Board Activation Not Requiring Additional Core Usage Rights

State	Active Cell Board Cores	Inactive Cell Board Cores	Notes
Before Cell Board Activation	4 active	4 inactive	No additional core usage rights are available on the complex
After Cell Board Activation	2 active, 2 inactive	2 active, 2 inactive	No additional core usage rights were required because the number of core usage rights was greater than the number of active cell boards

Instant Capacity Cell Board

Instant Capacity Cell Board and Considerations of Core Usage Rights

Example 6-2

Cell Board Activation Requiring Additional Core Usage Rights

In a different scenario, activation of an additional cell RTU can cause the number of core usage rights to be below the minimum (one active core per active cell board) and necessitate the acquisition of additional core usage rights. For example, consider an nPartition with one active cell board containing one active core and three inactive cores, and one inactive cell board with four inactive cores. The number of Intended Active cores is one and there are no available core usage rights on the complex. In this case, purchase of an additional cell RTU for the inactive cell board requires that an additional core usage right be purchased in order to meet the minimum requirement of one core per active cell board.

Table 6-2

Cell Board Activation Requiring Additional Core Usage Rights

State	Active Cell Board Cores	Inactive Cell Board Cores	Notes
Before Cell Board Activation	1 active, 3 inactive	4 inactive	No core usage rights are available on the complex
After Cell Board Activation	1 active, 3 inactive	1 active, 3 inactive	One additional core usage right was acquired because the number of core usage rights was less than the number of active cell boards

Activation of an Instant Capacity Cell Board

An Instant Capacity cell board is usually assigned to an nPartition; however, it does not participate in the boot of the nPartition. Activating an Instant Capacity cell board is a two step process:

- Step 1.** Set the cell board's use-on-next-boot flag to "y" (yes) using the `parmodify` command
- Step 2.** Perform a reboot of the nPartition (using the `shutdown -r` command on HP-UX)

Example 6-3

Activating a cell board in cabinet 0, slot 5, nPartition 3 (HP-UX)

For example, changing the use-on-next-boot flag to "y" on the Instant Capacity cell board in cabinet 0, slot 5, in nPartition 3 can be accomplished via the following command:

`/usr/sbin/parmodify -p 3 -m 0/5::y:`

If there are core usage rights available in the complex, the number of Intended Active cores is increased as high as possible, limited by the number of cores in the newly activated cell board. The available core usage rights are automatically used in the cell activation. If there are no available core usage rights, the number of active cores remains the same.

After you have set the cell board's use-on-next-boot flag to "y", and performed the reboot, you can use the `icapmodify` command to activate cores that are listed as Additional cores that can be assigned with current usage rights (as reported by the `icapstatus` command).

Activating an Instant Capacity cell board causes at least one core to become active on that cell board after reboot.

See the *HP System Partitions Guide* for details about adding and configuring cells in nPartitions.

Accidental Activation of an Instant Capacity Cell Board

If you inadvertently activate an Instant Capacity cell board, you can de-activate it by following this two step procedure:

- Step 1.** Set the cell board's use-on-next-boot flag to "n" (no) using the `parmodify` command
- Step 2.** Perform a reboot of the nPartition (this is not necessary if there was no reboot after the activation)

Example 6-4

De-activating a cell board in cabinet 0, slot 5, nPartition 3 (HP-UX)

For example, changing the use-on-next-boot flag to "n" on the Instant Capacity cell board in cabinet 0, slot 5, in nPartition 3 can be accomplished via the following command:

`/usr/sbin/parmodify -p 3 -m 0/5::n:`

The "n" in the above command line sets the cell board's use-on-next-boot flag to "no" and causes the cell board to not participate in the nPartition when it is booted.

See the *HP System Partitions Guide* for details about adding and configuring cells in nPartitions.

Instant Capacity Cell Board Activation Exception Error

When you attempt to activate an Instant Capacity cell board in an nPartition, depending on the number of core usage rights that are currently available in the complex, there is a chance the number of Intended Active cores for the nPartition is out of compliance and the activation fails. The following example illustrates this:

Table 6-3

nPartition pre-modification state: One cell assigned with 1 active core and 3 inactive cores; the complex has no additional core usage rights

Cell 1	Available Usage Rights
A III	none

Table 6-4

nPartition pre-modification state: Instant Capacity cell (#2) with 4 inactive cores

Cell 2
IIII

Table 6-5

nPartition requested state: Instant Capacity Cell (#2) cannot be activated in nPartition

Cell 1	Cell 2
A III	IIII

In this case, the `parmodify` command fails. This is because the nPartition would have 2 active cell boards, and therefore must have at least 2 active cores. With only one core usage right, the nPartition is out of compliance.

Instant Capacity Cell Board

Instant Capacity Cell Board Activation Exception Error

To activate the Instant Capacity cell board, and be in compliance, you must first purchase an additional core usage right (RTU), or deactivate a core in another partition if that is possible.

Instant Capacity Cell Board and Temporary Instant Capacity

You can only activate cores on activated cell boards for which cell board usage rights have been acquired. This is true for both permanent activation of a core or a temporary activation of a core using temporary capacity.

To acquire usage rights for an Instant Capacity cell board, you must acquire usage rights for the cell board and the entire amount of memory contained in it. See “Acquisition of Usage Rights (RTU) for Instant Capacity Cell Board” on page 106 for details.

Instant Capacity Cell Board

Instant Capacity Cell Board and Temporary Instant Capacity

This chapter covers the following topics:

- “Global Instant Capacity Overview” on page 118
- “Global Instant Capacity Requirements” on page 120
- “Global Instant Capacity Groups” on page 121
- “Global Instant Capacity Sharing Rights” on page 122
- “Global Instant Capacity Grouping Rules” on page 123
- “Creating Global Instant Capacity Groups” on page 124
- “Global Instant Capacity Resource Sharing” on page 128
- “Global Instant Capacity and Temporary Capacity” on page 132
- “Global Instant Capacity Member Removal” on page 134
- “Group Manager Availability” on page 135
- “Upgrades and Global Instant Capacity” on page 136
- “Rights Seizure” on page 137
- “Multiple Group Considerations” on page 138
- “Additional Considerations” on page 139

Global Instant Capacity Overview

Global Instant Capacity, or GiCAP, provides HP customers with the flexibility to move usage rights (RTUs) for Instant Capacity components within a group of servers, and it also provides “pooled” temporary capacity across the group. This provides more cost-effective high availability, more adaptable load balancing, and more efficient and easier use of temporary capacity. A GiCAP Group is managed using the `icapmanage` command.

GiCAP is not available with OpenVMS 8.3 at initial release.

GiCAP provides several benefits:

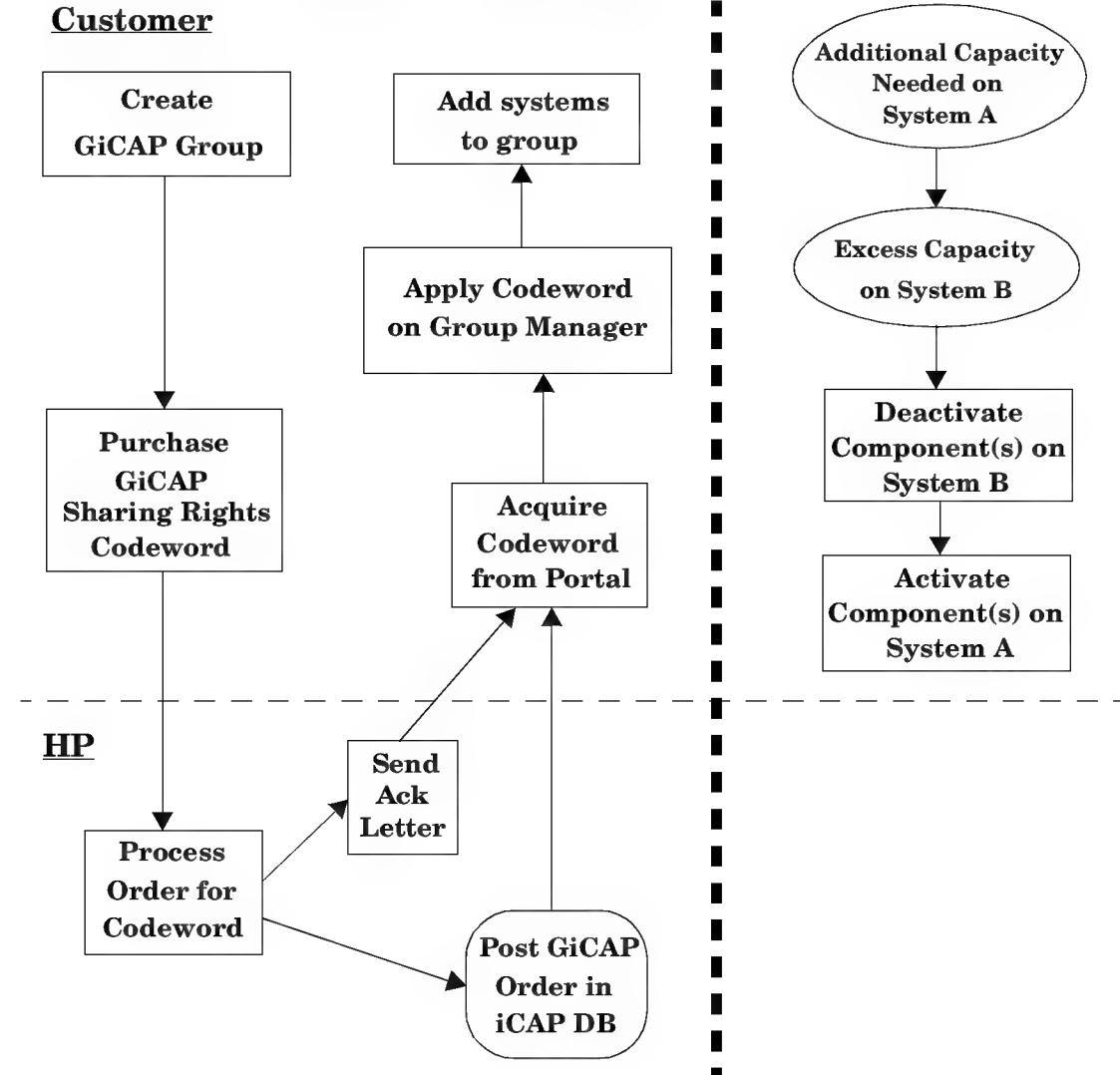
- Cost-effective High Availability. In case of planned or unplanned downtime, you can transfer usage rights from a failed partition on one server to one or more other servers in the group that are providing backup availability. Without GiCAP, the only way to provide this failover scenario is to provision each server with an adequate amount of temporary capacity in case of potential failures.
- Load Balancing. To provide adaptability and accommodation of changing demands, usage rights can be transferred between servers in a group. For example, a server with extra unused capacity can release usage rights to be used to activate additional components on an overloaded server that needs extra capacity.
- Pooled Temporary Capacity. Temporary capacity usage rights can be shared across servers for better efficiency and ease of use. By pooling temporary capacity, there is no need to provision temporary capacity for each server.

Global Instant Capacity is part of Instant Capacity versions 8.x on HP-UX systems, and is enabled by purchasing a special GiCAP Sharing Rights codeword. After purchase, the codeword can be retrieved from the HP Utility Pricing Solutions web portal, located at:

<http://www.hp.com/go/icap/portal>. When you retrieve the codeword, you will need to provide the sales order number for the codeword purchase, the serial number of the Group Manager system, as well as partition information for the Group Manager. Applying this codeword on an HP-UX system running Instant Capacity enables the creation of a GiCAP Group.

The following diagram illustrates the process of configuring and using Global Instant Capacity.

Figure 7-1 **Using Global Instant Capacity**



Global Instant Capacity Requirements

In order to use Global Instant Capacity, all partitions on all servers in the group must be running Instant Capacity version 8 or higher.

The OpenSSH Secure_Shell T1471AA bundle must be installed on the Group Manager and on all member systems in order to use Global Instant Capacity. Normally, it is distributed with the Operating Environment. A newer version may be available from the HP software depot (<http://www.hp.com/go/softwaredepot>).

NOTE

If OpenSSH is not installed or later removed, you will need to run the GiCAP key generation script `/etc/opt/ups/GiCAP_keygen` once OpenSSH is installed or reinstalled.

In order to create a GiCAP group with members, you must purchase GiCAP Sharing Rights, acquire the GiCAP codeword from the HP Utility Pricing Solutions portal (<http://www.hp.com/go/icap/portal>) and apply the associated codeword to the Group Manager system. GiCAP Sharing Rights are described in “Global Instant Capacity Sharing Rights” on page 122.

See “Instant Capacity Requirements” on page 26 for a complete list of all software requirements.

Global Instant Capacity Groups

For each group, an HP-UX system must be designated as the Global Instant Capacity Group Manager. It is this system which maintains information about the group, group resources, and the grouping rules. *icapmanage* commands are intended to be invoked only on a Group Manager system.

The Group Manager must be an HP-UX system running Instant Capacity version 8 or later software. The system running the Group Manager does not need to have any Instant Capacity components, nor does it need to be a partitionable system. A Group Manager cannot be run on a virtual machine (also known as a “guest”). The system must have a machine-readable serial number, as displayed by the command `getconf CS_MACHINE_SERIAL`.

The Group Manager may be run on either a partitionable or non-partitionable system. If run on a partitionable system, changing the configuration of the partitions may result in the Group Manager becoming inoperative. It is recommended that the Group Manager be on a separate server for optimal availability. The number of groups on a Group Manager has no impact on performance.

While the size of GiCAP groups is not specifically restricted, performance of group-related functions is affected by the number of group members and the number of partitions for each member server, as well as the types of hardware involved. A larger number of group members can cause an increase in startup time for the Group Manager and may also affect the performance of *icapmodify* commands when a transfer of usage rights occurs. If temporary capacity is being used, then the size of the group may also increase the amount of communication time needed for tracking of temporary capacity.

Global Instant Capacity Sharing Rights

While GiCAP is part of Instant Capacity and is installed at the same time as iCAP, it is not enabled during installation. In order to share resources across groups, you must purchase GiCAP Sharing Rights, acquire the GiCAP codeword from the HP Utility Pricing Solutions portal (<http://www.hp.com/go/icap/portal>), and apply the associated codeword to the Group Manager system. Application of the Sharing Rights codeword to the Group Manager system enables the addition of members with Instant Capacity components to groups.

You purchase at least as many GiCAP Sharing Rights as the total number of cores without usage rights across all the potential group members. Members can be added to a GiCAP group as long as there are sufficient Sharing Rights available, and as long as the grouping rules indicate hardware compatibility.

Note that unlike other iCAP codewords, GiCAP codewords must be generated for, and applied to, a specific partition if the Group Manager is on a partitionable system. This means that in order to retrieve the codeword, you must specify the purchase order number, the system serial number and partition information, if any. Use the `icapmanage -s` command on the Group Manager system to get the serial number and and nPar ID, or vPar code that is applicable.

GiCAP codewords have a sequence value and must be applied in the order in which they were generated for the Group Manager system. However, GiCAP codewords are sequenced independently from any other types of iCAP codewords that might be generated for the same system, and can therefore be applied independently from iCAP codewords.

Global Instant Capacity Grouping Rules

Global Instant Capacity is built on the concept of a server group, or GiCAP group. The group consists of a list of server complexes that are allowed to share Instant Capacity usage rights (for cores, cell boards, and memory) and temporary capacity. There are no particular constraints on the number of servers allowed to be in a group, but there are grouping rules defined by HP to specify the types of servers allowed to group together.

Grouping rules are defined based on server class. The price structure of usage rights is also based on server class. Since GiCAP pools usage rights, they can be used on any type of server regardless of the server class for which they were originally purchased. Therefore, grouping rules were created to define the classes of servers allowed to share usage rights.

Default grouping rules are provided with the Instant Capacity software. You can use the `icapmanage -R` command to view the hardware grouping information. When used in combination with a list of host names, it reports all hardware types with which the hosts might be grouped. If the hosts are not compatible with each other, no hardware will be reported. Without a list of host names, it will report all supported hardware and grouping rules.

Under some circumstances you may need to acquire newer grouping rules from the portal (for example, when adding new hardware not previously covered by the grouping rules currently in use). You install the encrypted rules file on the Group Manager system using the `icapmanage -i` command.

The following example installs a grouping rules file, retrieved from the portal, on the Group Manager system:

Example 7-1

Installing a grouping rules file

```
icapmanage -i -U FSTL012234_gicap.encrypt
```

Creating Global Instant Capacity Groups

After the sharing rights codeword and the grouping rules have been applied to the Group Manager (as needed), a GiCAP group can be created by issuing the `icapmanage` command using the `-a` and `-g` options.

Members are added by issuing the `icapmanage` command using the `-a` option, the `-g` option to select the group name, and the `-m` option to specify a name for the new member along with a list of hosts running on the system. The list of hosts must include at least one host per nPartition on the system.

Note that a single partition of a complex cannot join a GiCAP group; all partitions of a complex must be specified when creating a group member. An iCAP server can join a group if the Group Manager has at least as many GiCAP Sharing Rights as the total number of iCAP cores on that server. Members can be added to a GiCAP group as long as there are sufficient GiCAP Sharing Rights available and it is permitted by the grouping rules. Each member that joins the group decreases the available GiCAP Sharing Rights by the number of cores without usage rights contributed by that member complex.

When adding groups to a Group Manager system, the `icapmanage -T` command tests hardware compatibility for one or more host systems in order to determine which groups the systems can join. When used in combination with the `-g` option to specify a group name, it tests whether the specified host systems have hardware which is compatible with the group. Without the `-g` option, it reports which groups of all the groups managed by this Group Manager have hardware which is compatible with the host systems. The host names do not have to be from the same complex, but in order to best predict the possibility of being able to join a group, the list of hosts should include all the nPartitions for a particular complex. If the hosts are not compatible with each other, no groups will be reported as having compatible hardware.

You can create multiple GiCAP groups and they can be managed by the same Group Manager or by different Group Manager systems. Systems which do not have any Instant Capacity components can be part of a GiCAP group. Deactivating resources on these systems allows them to loan usage rights to other members in the group.

The following example shows how to apply a Sharing Rights codeword, create a group, and show group status:

Example 7-2 Applying a Sharing Rights Codeword and Creating a Group

```
icapmanage -C \
R8J2DBW.5UTxyWQ.2MekJ43.G5cdTVP.1-m9kvweQ.AYqEXym.wj3dyLj.Fbtg7s1
```

The following valid codeword has been applied to the complex:

```
Global Instant Capacity Sharing Rights Codeword
32 Sharing Rights
```

Use `icapmanage(1M)` to see the results of the application of this codeword.

```
icapmanage -a -g one
```

Group one added.

```
icapmanage -s
```

```
Software version: B.08.00.01
32 GiCAP Sharing Rights: 0 in use, 32 available
Group ID: one
Group Members:
    No members found
```

The following example updates the grouping rules for all groups managed by the Group Manager, tests if a server complex has hardware which is compatible with group “one”, and adds a member called “IT” to that group. Note that when you first adjust a group, you will be prompted for the root password for each specified host. The password is used only for initial communication and is not saved or stored.

Example 7-3 Adding a Member to a Group

```
icapmanage -i -U /tmp/GiCAP.rules
icapmanage -T node.corp.com -g one
root@mypar.node.corp.com's password:
Server mypar is compatible with GiCAP group one
icapmanage -a -m IT:node.corp.com -g one
Member IT added to group one.
```

Global Instant Capacity

Creating Global Instant Capacity Groups

Following is an example of the output of `icapstatus` on a group member system:

Example Output of `icapstatus` on a group member system

`/usr/sbin/icapstatus`

```
Software version: B.08.00.01
System ID: z006
Serial number: USR4020003
Product number: A6093A
Unique ID: Z3e0ec8e078cd3c7b
System contact e-mail: mjones@corp.com
From e-mail: Set to the default ('adm')
Asset reporting: on
Temporary capacity warning period: 15 days
Exception status: No exception

Member z006 in GiCAP group MyGroup, managed by zoo.corp.com
  Borrowed core usage rights: 0
  Borrowed cell usage rights: 0
  Borrowed memory usage rights: 0.0 GB

Local nPartition Status
-----
Total number of configured cores: 8
Number of Intended Active cores: 2
Number of active cores: 2
Number of inactive cores: 6
Additional cores that can be activated with current usage rights: 0
Number of cores that could be activated with additional usage rights: 6
Number of cores that can be activated with temporary capacity: 6
Number of cores that are deconfigured or attached to inactive cells: 0

Instant Capacity Resource Summary
-----
Number of cells without usage rights: 0
Number of inactive cells: 0
Amount of memory without usage rights: 0.0 GB
Amount of inactive memory: 0.0 GB
Number of cores without usage rights: 6
Number of inactive cores: 6
```

Global Instant Capacity
Creating Global Instant Capacity Groups

Number of cores using temporary capacity: 0
Temporary capacity available: 60 days, 0 hours, 0 minutes
Projected temporary capacity expiration: N/A

Allocation of Instant Capacity Resources among the nPartitions

nPar ID	Intended		Actual		Memory Cells	iCAP	nPar Name	Runs		
	Total Cores	Active Cores	Active Cores	=====					Inactive	=====
	=====	=====	=====	=====					=====	=====
0	8	2	2	6	0.0 GB	0	Yes	zoo0 (local)		
1	8	8	8	0	0.0 GB	0	Yes	zoo1		
N/A	0	N/A	N/A	N/A	0.0 GB	0	N/A	Unassigned Cells		

Global Instant Capacity Resource Sharing

Once a group has been established, Instant Capacity resources (core, cell board, memory usage rights, and temporary capacity) may be shared among all the members of the group. The sharing can occur in several ways:

- During creation of the group, some members may have unused usage rights so that by simply joining the group, additional usage rights are available for use by any member of the group.
- Even if there are no unused usage rights across the group, a member of the group may deactivate resources (cores, cells or memory) to make additional usage rights available for activation by any other member in the group.
- Temporary capacity from all members of the group is available for use by any member of the group.

Usage rights are shared by deactivating resources on one group member, and then activating resources on another member of the group. In effect, the system on which the resources were deactivated is loaning usage rights to the activating (or borrowing) system. The activation and deactivation commands are done using the usual `icapmodify` commands on the individual member systems to effect this “loan” operation (also sometimes referred to as a transfer of usage rights).

Any temporary capacity available to individual members of the group is combined into a larger pool of temporary capacity that is available for consumption by any and all members of the group, as needed. Initiating usage of shared temporary capacity is the same as with individually purchased TiCAP: group members use the `icapmodify -a -t` command to activate shared temporary capacity. Note that this differs from the sharing of usage rights in that temporary capacity is never a “loan” to be returned; it is always depleted through its usage over time.

Example 7-4

Core Rights Sharing

In the following scenario, no member of the group mygroup has core usage rights immediately available. Group member member1 has an immediate need for more processing power. However, group member member2 can loan a core usage right by deactivating one core.

First, member2, currently with 8 active cores, will deactivate one core:

```
member2> icapmodify -d 1
```

7 cores are intended to be active and are currently active

The core usage right from member2 is now available for any member of the group, and can be used to activate an additional core on member1:

```
member1> icapmodify -a 1
```

8 cores are intended to be active and are currently active.

The output of the icapstatus command on the loaning system member2 will show that the Number of Intended Active Cores and Number of active cores have decreased by one, and the Number of inactive cores and Number of cores without usage rights have increased by one. On the borrowing system member1, the Number of Intended Active Cores and Number of active cores have increased by one, and the Number of inactive cores and Number of cores without usage rights have decreased by one.

The output of icapmanage -s on the Group Manager system will show that the total number of cores without usage rights for the group has not changed.

Effect of Temporary Capacity

In systems where usage rights and temporary capacity are available, Instant Capacity tends to use usage rights before temporary capacity. In a situation where temporary capacity is being used on at least one member system, a component on another member is deactivated, and a component on a third member system needs to be activated, the usage rights made available by the deactivated component may be taken by the system using temporary capacity. In this case it may be necessary to use the “-t” option to icapmodify to activate the component using temporary capacity.

Status Reporting

Usage rights and temporary capacity can sometimes be temporarily assigned to the Group Manager, which can cause some unexpected results. The total temporary capacity reported for the group by `icapmanage -s` may not equal the sum of temporary capacity reported by each member system. This is because the Group Manager will prefetch an amount of temporary capacity in anticipation of needing it for a future operation, so the temporary capacity may not be immediately assigned to a member system.

The values reported by `icapstatus` for borrowed and loaned usage rights are not adjusted when usage rights remain unassigned. This usually happens when usage rights are released by one member system and are not immediately used by another member system. In this case, the released usage rights remain assigned to the Group Manager. The borrowed and loaned values for the group members may not reflect the total usage rights for the group.

Example 7-5

Cell/Memory Sharing

In the following scenario, member1 of the group mygroup has an inactive cell it wants to activate, but no usage rights are available on the system. However, member2 of the group has available usage rights.

First, we can see from the output of `icapstatus` on member1 that no cell or memory usage rights are available:

```
Instant Capacity Resource Summary
-----
Number of cells without usage rights: 1
Number of inactive cells: 1
Amount of memory without usage rights: 16.0 GB
Amount of inactive memory: 16.0 GB
Number of cores without usage rights: 8
Number of inactive cores: 8
```

The output of `icapstatus` on member2 shows that memory and cell usage rights are available:

```
Instant Capacity Resource Summary
-----
Number of cells without usage rights: 1
Number of inactive cells: 2
Amount of memory without usage rights: 16.0 GB
Amount of inactive memory: 32.0 GB
Number of cores without usage rights: 8
Number of inactive cores: 8
```

In this situation, it is not necessary to deactivate components on member2 since the system is under-utilized and usage rights are available. The usage rights from member2 are available to member1, and the cell can be activated:

```
member1> parmodify -p 0 -m 2::y:
```

After a reboot, all of the components on member1 will be active.

Global Instant Capacity

Global Instant Capacity and Temporary Capacity

Global Instant Capacity and Temporary Capacity

Temporary capacity can be shared across servers for better efficiency and ease of use. By pooling temporary capacity, it is immediately available to all members of a group without the need to purchase temporary capacity for each server.

Example 7-6

Activation Using Pooled Temporary Capacity

In the following scenario, member1 of mygroup has two active cores and needs to activate six more cores, but only five usage rights are available in the group. There is no temporary capacity available on member1. Other members of mygroup have a sufficient amount of temporary capacity, so we can activate the cores using temporary capacity:

```
member1> icapmodify -a 6 -t
8 cores are intended to be active and are currently active.

Number of cores using temporary capacity: 1
Projected temporary capacity expiration: Less than 30 minutes
```

Notice that five additional cores are permanently activated with the available usage rights, and only the last core is activated with TiCAP. Initially only 30 minutes of TiCAP are transferred to member1, since 30 minutes of TiCAP are transferred per core activated with TiCAP. Every 30 minutes the daemon checks if TiCAP is depleted and will acquire more from the group as needed.

Temporary Capacity and Freed Usage Rights

When a complex is consuming temporary capacity, the iCAP daemon periodically decrements a complex's temporary capacity balance. Before doing so it will contact the Group Manager to determine if there are available core usage rights on other group members. If no such usage rights are available, temporary capacity will continue to be consumed. If usage rights are available anywhere in the group, they will be transferred to the complex using temporary capacity in order to stop temporary capacity consumption on that complex.

Global Instant Capacity
Global Instant Capacity and Temporary Capacity

Between the time the core usage rights are made available and the iCAP daemon checks for temporary capacity consumption, `icapstatus` will report that temporary capacity is being consumed when it is not. When the transfer of usage rights is completed, the `icapstatus` output will be updated on both systems to reflect the transfer. Due to the delay, the changes may appear to be unrelated to a user-initiated operation, but they are due to the previously initiated deactivation that freed up core usage rights.

Temporary Capacity and Status Reporting

The temporary capacity balance reported by `icapstatus` on a group member reflects only the temporary capacity that has been applied to, or transferred to that system via the Group Manager. You may still receive temporary capacity expiration warning messages even though more temporary capacity is available in the group.

Temporary capacity is transferred to group members in 30-minute blocks. Once a block of temporary capacity has been consumed, the Group Manager will continue to transfer group temporary capacity to the system every 30 minutes as long as it is available. However, the local `icapstatus` on the system may report temporary capacity as expired even though it is still being used to activate cores, as shown in the `icapstatus` listing of “Number of cores using temporary capacity”.

Temporary Capacity Prefetch

Since temporary capacity is pooled for the group, adjustments to the temporary capacity balance can be made even when it is not being consumed. For performance reasons, the Group Manager anticipates potential future use of temporary capacity and may prefetch an amount of temporary capacity from one or more member systems. Although temporary capacity will not be used on a member system unless the “-t” option was specified with the `icapmodify` command, an `icapmodify` command without the “-t” option may still result in an adjustment of the temporary capacity balance for members of the group. When this happens, the overall temporary capacity balance for the group does not change, but there may be differences in the allocation to individual member systems.

Global Instant Capacity Member Removal

Before removing a member from a GiCAP group, all the borrowed usage rights must be returned and all outstanding loans reclaimed. Do this by deactivating resources on the appropriate system. There is no need to activate resources to reclaim loaned usage rights. The act of removing the member from a GiCAP group will reclaim the necessary usage rights.

There is no constraint with respect to temporary capacity as it is consumed shortly after it moves from one member in a GiCAP group to another that requires it; it is never “returned”.

When a member is removed from a group, some number of Sharing Rights are released and become available for future use. The number freed is equal to the number of cores without usage rights contributed by that member.

The following example removes member “IT” from its group, and then removes group “one”:

Example 7-7

Removing a Group

```
icapmanage -r -m IT
```

Member IT removed.

```
icapmanage -r -g one
```

Group one removed.

Group Manager Availability

If the Group Manager becomes unavailable, management of the GiCAP Group will be unavailable until the Group Manager is restored or replaced. The GiCAP Group members will continue operating as isolated iCAP systems, using whatever usage rights they had available when the Group Manager became unavailable. A GiCAP Group member using borrowed usage rights will be able to continue using those usage rights. A GiCAP Group member that has loaned usage rights to other members in the GiCAP Group will not be able to recover those usage rights until the Group Manager has been restored.

Loaned and borrowed usage rights remain in place in GiCAP Group members. All usage rights held by the Group Manager itself are left unavailable until the Group Manager is restored.

Normally, usage rights are not held by the Group Manager, but this can occur after a member is removed from a GiCAP Group, or if the Group Manager should become unavailable during the transfer of usage rights from one GiCAP Group member to another.

Upgrades and Global Instant Capacity

Care must be exercised before upgrading or changing hardware for any member of a GiCAP group. If a member of a GiCAP group changes hardware in such a way that the hardware is no longer compatible with the group, then the group is considered to be out of compliance and group functions are restricted.

Also, note that the number of available Sharing Rights is adjusted whenever an iCAP codeword is applied to a GiCAP member system which modifies the number of cores without usage rights on that member. (RTU and AddOn codewords for cores cause such adjustments.)

If available Sharing Rights go negative (more in use than were purchased for the Group Manager), then all groups managed by that Group Manager are out of compliance and all group functions are restricted until the problem is resolved. The problem can be resolved by purchasing and applying additional Sharing Rights to the Group Manager, purchasing and applying core usage rights (RTUs) to one or more group members, or by removing one or more group members from their group.

When such an incompatibility is detected, the GiCAP Group Manager sends e-mail to the local root account and to the registered contact e-mail address for each member of the group.

Adding New Partitions

When reconfiguring a member system by adding or deleting an nPartition, you must first remove the system from the group, and then re-add the member to the group (specifying the nPartition) after adding or deleting the nPartition. Also, if you wish to add additional contact points for a member system, you must remove and re-add the system to the group and specify additional hostnames for the system with the `icapmanage -a -m` command.

If the Group Manager is run on a partitionable system, changing the configuration of the partitions may result in the Group Manager becoming inoperative.

Rights Seizure

You can use the `icapmanage -x` command to extract available core usage rights from the specified host to make them available to other group members. The host must be a system which is not currently running (the system is down), but must be part of a server complex that contains at least one partition that is up and accessible to the Group Manager software. The hard partition containing the host will have the value `Intended Active` set to the required minimum (one core per configured cell).

When you use `icapmanage -x` to seize rights from another system which has a partition down, the change in usage rights is available only at the group level (`icapmanage -s`). Seized usage rights remain unassigned until they are requested to be used by a subsequent activation.

The following example extracts core usage rights from a partition that is down, so that they will be available for other group member activations.

```
icapmanage -x mypar1.node.hp.com
```

Multiple Group Considerations

You can create multiple GiCAP groups and they can be managed by the same Group Manager or by different Group Manager systems.

A server complex can only be a member of a single GiCAP group at a time. In order to participate in a different group, it must be removed from one group before being added to the other group.

Sharing Rights can never be transferred between two Group Manager systems. As you create new groups and/or add new members to existing groups, you may need to purchase and apply additional Sharing Rights to the relevant Group Manager systems.

Additional Considerations

Systems which do not have any Instant Capacity components can be part of a GiCAP group. Deactivating resources on these systems allows them to loan usage rights to other members in the group.

Members of a GiCAP group do not have to be located near each other. IP connectivity between the members and the Group Manager, sufficient GiCAP Sharing Rights, and adherence to the GiCAP grouping rules are the only constraints.

The GiCAP software uses the HP-UX Secure Shell product to provide secure communication between the Group Manager and the group members. If SSH is installed after Instant Capacity, a provided script (`/etc/opt/iCAP/GiCAP_keygen`) must be invoked in order to configure secure communication.

It is recommended that the IP address of the Group Manager not be a dynamic address. The member systems of a GiCAP group store the IP address of the Group Manager and therefore will lose communication with the Group Manager if the IP address changes. If the Group Manager's IP address changes and it loses communication with the member systems, the Group Manager can remove and re-add the members.

If the GiCAP Group Manager system becomes unavailable, usage rights and temporary capacity remain as per allocated to each group member. Within a server complex, the usage rights can be deployed to other partitions, but movement of usage rights between complexes is unavailable when the Group Manager is unavailable.

On a system with full usage rights, the `icapd` daemon does not constantly check the system configuration. It can take up to 12 hours for each partition of a system converted from non-iCAP to iCAP to discover that it is now an iCAP system. During this time, `icapmanage -s` will show asterisks for the new member, and `icapstatus` on that system will show "Runs iCAP" as "N". To force a faster conversion, kill and restart the `icapd` daemon.

Global Instant Capacity

Additional Considerations

This chapter covers the following topics:

- “Handling Compliance Exceptions” on page 142
- “Troubleshooting the Instant Capacity Software” on page 145
- “Diagnosing E-mail Configuration” on page 148

Handling Compliance Exceptions

A complex can get out of compliance with the Instant Capacity contract if any of the following occurs:

- More cells are active than expected (not enough inactive cells)
- More memory is active than expected (not enough inactive memory)
- More cores are active than expected (not enough inactive cores)
- There is a negative temporary capacity balance
- (GiCAP) Not enough sharing rights
- (GiCAP) Hardware added which is incompatible with the group

NOTE

Your system may be out of compliance due to having different Instant Capacity software products installed. For example, if a partition has the old product B9073AA installed (Instant Capacity versions B.03.x through B.05.x) and another partition in the same system has the new product B9073BA installed (Instant Capacity version B.06.00 or greater), the B9073BA software assumes that all components in partitions that have B9073AA installed are active. See “Upgrading to Instant Capacity versions B.06.x or later (HP-UX)” on page 162 for details of correcting this non-compliant state.

The Instant Capacity software sends an exception report (via e-mail) if one of the above exception conditions occurs. Exception information is also written to the system log file. In some cases, compliance is enforced by deactivating cores at boot time. See also “Temporary Instant Capacity Expiration and Compliance Enforcement” on page 94 and virtual partition “Boot Time Compliance” on page 177 for more details about enforcement.

The following page contains an example of the e-mail exception report for having more cores active than expected:

Example 8-1 Exception Report for More Cores Active than Expected

To: root@par1.yourorg.com
Subject: Instant Capacity Exception Report

This message is being sent to inform you that your Instant Capacity complex (containing the partition par1) is in an exception state based on the following detected exceptions:

More cores active than expected

This complex is out of compliance with the Instant Capacity contract. The listed exceptions must be corrected as soon as possible.

'More cores active than expected' means that the number of active cores across the complex exceeds the number of core usage rights. For details of core usage, use the icapstatus command. This exception state may be corrected by: deactivating cores until the number of inactive cores matches the global number of cores without usage rights, as reported by icapstatus. Alternately, additional core usage rights can be purchased for permanent activation, or temporary capacity (TiCAP) can be purchased and applied to the complex.

NOTE: When a system is in an exception state, many system management operations are likely to fail. These include, but are not limited to: the ability to activate cores, the ability to manage hard partitions (nPars), the ability to manage virtual partitions (vPars).

NOTE: One or more of the exceptions listed in this mail may be due to assumptions made because of an inability to get complete information (see icapstatus output for details).
In some cases, exception states arise when partitions are not shut down properly, or have been loaded without Instant Capacity software. To eliminate these possibilities, do the following:
1) always use the "shutdown" command when shutting down a partition.
2) boot any partitions that may have been shutdown improperly.
3) ensure that all cells in the system are powered on.
4) ensure that Instant Capacity software is properly loaded and configured on all partitions.

NOTE: An exception related to cells, memory, or cores may occur if a cell containing inactive components is removed from the complex (e.g. for repairs or upgrades). Because Instant Capacity compliance requires that the number of inactive components on the complex must match the number of components without usage rights, you may need to adjust the number of inactive components on the complex if a cell containing inactive components is removed.

See the Instant Capacity User's Guide at /usr/share/doc/icapUserGuide.pdf for more information.

Troubleshooting

Handling Compliance Exceptions

As mentioned above, you can also get an exception report for other exception conditions. Here are the other conditions and examples of the appropriate exception report content:

Example 8-2 Content of Exception Report for More Cells Active than Expected

More cells active than expected

'More cells active than expected' means that the number of active cells across the complex exceeds the number of cell usage rights. To find out how many inactive cells are expected on the complex, run icapstatus and look at the global number of cells without usage rights. This exception may be corrected by using parmodify to set the use_on_next_boot flag for an assigned cell to "n", followed by a partition reboot. Alternately, cells may be turned off after a partition reboot, unassigned from partitions, or additional cell usage rights may be purchased for permanent activation.

Example 8-3 Content of Exception Report for More Memory Active than Expected

More memory active than expected

'More memory active than expected' means that the amount of active memory across the complex exceeds the available memory usage rights. To find out how much inactive memory is expected on the complex, run icapstatus and look at the global amount of memory without usage rights. Typically, this exception occurs when a newly added cell without usage rights is activated, but it may also occur when a cell with a small amount of memory is deactivated and replaced with a cell with a greater amount of memory. To correct this exception, one or more cells will have to be deactivated in order to deactivate the appropriate amount of memory. This can be done by using parmodify to set the use_on_next_boot flag for an assigned cell to "n", followed by a partition reboot. Alternately, cells may be turned off after a partition reboot, unassigned from partitions, or the appropriate amount of memory usage rights may be purchased for permanent activation.

Example 8-4 Content of Exception Report for Negative Temporary Capacity Balance

Negative temporary capacity balance

'Negative temporary capacity balance' means that the authorized temporary capacity (TiCAP) balance on the system has been depleted and continued use of core(s) without usage rights has caused additional (unauthorized) temporary capacity to be consumed. To correct this exception, first correct any 'More cores active than expected' exception so that the temporary capacity balance does not continue to grow more negative. Then, purchase additional temporary capacity and apply the temporary capacity codeword to the complex. Alternately, purchase additional usage rights to match the number of core(s) consuming temporary capacity and apply the Right to Use (RTU) codewords to the complex.

Troubleshooting the Instant Capacity Software

In the event the Instant Capacity software is not functioning, perform the following steps:

Step 1. Verify that the Instant Capacity software is installed and not corrupted. On HP-UX systems, this can be done by entering the following command:

/usr/sbin/swverify B9073BA

You should see **Verification succeeded.** in the output of the **swverify** command.

On OpenVMS systems, enter the following commands to verify that the Instant Capacity and WBEM software are installed and configured:

```
$ @sys$manager: ICAP$CLI_UTILS.COM CONFIG_CHECK
$ show log ICAP$CONFIGURED
"ICAP$CONFIGURED" = "TRUE" (LNM$JOB_nnnnnnnn)
```

```
$ pipe product show hist | search sys$pipe WBEMCIM
HP I64VMS WBEMCIM A2.0-A051013F Full IP Install Val
16-APR-2006
```

Step 2. (HP-UX) If there is an error from the **swverify** command in **Step 1** (above) then reinstall the Instant Capacity software. Refer to “Installing Instant Capacity Software” on page 50 for details.

(OpenVMS) If the Instant Capacity software is not configured, configure it using **SYS\$MANAGER: ICAP\$CONFIGURE.COM**. If the WBEMCIM software is not installed, install it using the **PRODUCT INSTALL** utility.

Step 3. Verify that the status of your Instant Capacity system/partition is correct by entering the following command:

(HP-UX) /usr/sbin/icapstatus

(OpenVMS) \$ICAP SHOW STATUS

You should see something similar to “B.08.00” as the Instant Capacity software version. If you do not have a version 8 installed, install the

Troubleshooting

Troubleshooting the Instant Capacity Software

Instant Capacity 8.x software.

If there is a discrepancy between the number of reported components with or without usage rights and your Instant Capacity contract, send an e-mail to the Instant Capacity administrator at `icap_admin@hp.com` that explains the discrepancy.

Step 4. Ensure that the required processes for Instant Capacity are running.

On HP-UX systems, verify that the `icapd` daemon is running on the system/partition by entering the following command:

```
/usr/bin/ps -e | grep icapd
```

You should see the `icapd` daemon running on the partition. If it is not running, check the system log file (`syslog`) for `icapd` error messages and take the appropriate action.

On OpenVMS systems, verify that the `ICAP_SERVER` and `WBEM_CIMSERVER` processes are running:

```
$ pipe show sys | search sys$pipe ICAP_SERVER  
%SEARCH-I-NOMATCHES, no strings matched
```

```
$ pipe show sys | search sys$pipe CIMSERVER  
202046D CIMSERVER HIB 10 8335702 0 00:22:46.98 75250 77655 M
```

You should see a line of output listing the process information. In the above example, the `CIMSERVER` process is running and the `ICAP_SERVER` process is not running.

Step 5. (HP-UX) Ensure that the kernel driver `diag2` is built into the kernel.

Step 6. (HP-UX) Ensure that the `NParProvider` bundle is installed.

Step 7. Ensure that the required `WBEM` provider modules are installed and running.

On HP-UX systems, the `WBEM_B8465BA` bundle (version A.01.05 or higher) must be installed.

On OpenVMS systems, verify the `WBEM` installation using the following commands:

```
$ cimprovider ::= $WBEM_OPT:[wbem.bin]cimprovider  
$ pipe cimprovider -l | search sys$pipe -  
"HP_NParProviderModule","HP_iCAPPProviderModule",
```

```
"HP_iCODProviderModule"  
HP_NParProviderModule  
HP_iCAPPProviderModule  
HP_iCODProviderModule
```

All three of the provider modules listed above must be loaded.

Step 8. (HP-UX) Make sure par commands such as parstatus are working. For failures in virtual partitions, check the vPar commands such as vparstatus.

Step 9. Check the Instant Capacity log file and syslog file for any error messages. On HP-UX systems, these files are /var/adm/icap.log and /var/adm/syslog/syslog.log. On OpenVMS systems, these files are sys\$manager:icap.log and sys\$manager:operator.log.

Additional Troubleshooting Steps for E-mail Connectivity

If you are utilizing asset reporting, perform the following additional troubleshooting steps to ensure that HP is able to receive an e-mail message from the Instant Capacity software:

Step 1. Execute the command:
`/usr/sbin/icapnotify <reply_address>`

Where *reply_address* is the e-mail address where you desire HP to send a confirmation message.

Step 2. Verify that HP replies with a confirmation message, via e-mail, to the reply address specified in **Step 1**

If you do not receive the confirmation e-mail message in **Step 2** from HP then your partition is unable to send e-mail over the internet to the hp.com domain. See “Diagnosing E-mail Configuration” on page 148 for details on troubleshooting your e-mail configuration.

Diagnosing E-mail Configuration

You can use the following steps to confirm the e-mail configuration or to aid in debugging the configuration:

- Step 1.** Send an e-mail message from your system to an e-mail address in the same domain (intranet) and confirm receipt of the e-mail message.
- Step 2.** Send an e-mail message from your system to an e-mail address outside of your domain (to the internet, for example, to a yahoo or hotmail e-mail address) and confirm receipt of the e-mail message.
- Step 3.** Send an e-mail message from your system to someone at HP (for example, a HP representative in a local account team) and confirm the person at HP received the e-mail message.
- Step 4.** As root, execute the command:

```
/usr/sbin/icapnotify <reply_address>
```

This command sends an e-mail message to HP's audit application. HP sends a confirmation e-mail message to the reply address that is specified. Receipt of the confirmation e-mail message confirms successful e-mail configuration.

- Step 5.** If the previous steps are all successful, but asset reports are still not visible at the HP portal, examine your e-mail configuration to determine if outgoing messages are automatically being modified or appended, for example, to include something like a privacy notice. Additions or modifications to encrypted asset reports may cause them to be rejected by the portal.

If any of the above steps do not produce the correct result, see "Configuring E-Mail on Instant Capacity Systems" on page 184 for details on how to correctly configure e-mail connectivity for Instant Capacity.

This chapter covers frequently asked questions on the following topics:

- “Instant Capacity Software” on page 150
- “Instant Capacity Hardware” on page 156
- “Global Instant Capacity” on page 157

Instant Capacity Software

What software product is required for Instant Capacity on Itanium-based servers running HP-UX 11i v2?

The HP software bundle for the Instant Capacity versions 8.x software, on Itanium-based servers running HP-UX 11i v1 or 11i v2, is HP product number B9073BA.

Can one HP enterprise server be under both a Pay per use (PPU) and Instant Capacity contract at the same time?

No, the Pay per use and Instant Capacity software bundles are mutually exclusive. They can both be installed on the same HP enterprise server, but because the server can only be purchased using either PPU or Instant Capacity (but not both), the server can only be configured for the purchased pricing solution.

Where can I find the Instant Capacity 8.x software bundle?

The Instant Capacity 8.x software bundle (B9073BA for HP-UX systems, BA484AA for OpenVMS systems) is installed at the factory for new HP-UX systems and is automatically installed on OpenVMS I64 V8.3 systems when the operating system is installed. However, if you need to install the software it is available from the following:

- (HP-UX only) HP web site: <http://www.hp.com/go/softwaredepot> (search for "Instant Capacity")
- September 2006 HP-UX 11i v2 Operating Environments (OE) media (DVD)
- September 2006 HP-UX 11i v2 Applications Software media (DVD)
- September 2006 HP-UX 11i v1 Applications Software media
- July 2006 OpenVMS 8.3 Operating System Media

See "Installing Instant Capacity Software" on page 50 for details of installing the Instant Capacity 8.x software bundle.

One of my HP-UX or OpenVMS applications has compatibility issues with the Instant Capacity software. How do I correct the problem?

The application may have a problem when cores are activated or deactivated. Some applications size themselves at system startup based on the number of active cores and they don't adjust for core increases or decreases. See "Software Application Considerations" on page 79 for details.

We would like to utilize temporary capacity on our Itanium-based server. What system configuration is necessary and how do we acquire Temporary Instant Capacity?

See Chapter 5, "Temporary Instant Capacity," on page 83 for details of temporary capacity. First, purchase Temporary Instant Capacity (TiCAP) from your HP sales representative, acquire and apply the TiCAP codeword, and then you can activate additional cores with temporary capacity. If you want asset reporting in order to view temporary capacity balances on the Utility Pricing Solutions portal, then make sure that e-mail is properly configured for the system you plan on using temporary capacity. See "Diagnosing E-mail Configuration" on page 148 for details.

How much history is retained in the Instant Capacity log files?

The Instant Capacity log files retain up to 2 MB of Instant Capacity events. An Instant Capacity event occurs, and is written to the log files, when one of the following happen:

- The Instant Capacity software sends an asset report to HP (daily at noon)
- A partition with Instant Capacity is shut down
- A partition with Instant Capacity is started
- A partition with Instant Capacity has a configuration change (that is, a core is activated or deactivated)
- A codeword is applied
- A GiCAP group is created or removed
- A member is added to or removed from a GiCAP group
- Usage rights are seized from a system

Frequently Asked Questions
Instant Capacity Software

You can view all events in the Instant Capacity log files by viewing the file `/var/adm/icap.log` or `/var/adm/icap.log.old` on HP-UX systems, and `sys$manager:icap.log` on OpenVMS systems.

How can I obtain codewords for newly purchased usage rights (RTUs) if the Utility Pricing Solutions portal is down?

If the Utility Pricing Solutions portal is down, contact the HP Response Center. The Response Center can create an emergency codeword via the Instant Capacity codeword backup tool. If you do not receive a timely response from the HP Response Center, contact the Instant Capacity administrator by sending an e-mail message to: **icap_admin@hp.com**. The administrator can also create an emergency codeword via the Instant Capacity codeword backup tool.

What licensing is required for the Instant Capacity software?

For Instant Capacity versions 8.x, if you desire to utilize additional components (cores, cell boards, or memory) then you must acquire additional usage rights (RTUs) individually. See “Usage Rights Requirement” on page 30 for details.

The resulting configuration of my Instant Capacity system does not agree with what I ordered from HP. How did this configuration change occur?

The Instant Capacity software is able to control the granularity of processor activation/deactivation to the single core level. The Instant Capacity ordering and manufacturing rules often do not allow such fine granularity.

The Instant Capacity ordering rules dictate the quantity of cores with and without usage rights in the cell boards. Because the Instant Capacity software distributes the core usage rights (for a given partition) in a manner that optimizes loads across all cells, the resultant configuration may be different than the original order — but the number of cores with and without usage rights matches what was ordered.

For example, consider the situation where you order an rx8620 server with two cell boards, in which cell board #1 contains 4 active cores with usage rights and cell board #2 contains 2 active cores with usage rights and 2 inactive cores without usage rights; a total of 6 active and 2 inactive cores. At runtime, the Instant Capacity software balances the distribution of active cores across the cell boards so that each cell has 3 active cores with usage rights and 1 inactive core without usage rights.

How does Instant Capacity interact/coexist with partitions running software other than HP-UX?

Instant Capacity is supported only on HP-UX and OpenVMS Integrity systems. If other partitions of an Instant Capacity system are running another operating system, then the Instant Capacity software assumes that all the system components in the non-HP-UX and OpenVMS partitions are active components (with usage rights). When checking for the correct number of inactive components without usage rights, only the HP-UX and OpenVMS partitions will be examined.

What e-mail is sent by the Instant Capacity software?

The following table lists the e-mail messages sent to the system from the Instant Capacity software. Note that on OpenVMS systems, the iCAP software agent is `ICAP_SERVER` rather than `icapd`.

Table 9-1

E-mail sent by the Instant Capacity software

Triggered By	E-mail Message
<code>icapmodify</code> (if a configuration change occurs)	Information about the configuration change is sent to the system-contact, if specified, and if change notification is set to "on".
<code>icapd</code> (daily, when the projected TiCAP balance expiration is less than the warning period: by default, when less than 15 days)	A temporary capacity expiration notification is sent to the system-contact, if specified, and <code>root</code> .
<code>icapd</code> (daily, if more than expected cores, memory, cells, are active — also if TiCAP has a negative balance)	An exception report (for non-compliance) is sent to the system-contact, if specified, and <code>root</code> .
<code>icapd</code> (if one or more cores is deactivated at boot time to enforce compliance)	A temporary capacity enforcement message is sent to the system-contact, if specified, and <code>root</code> .

Frequently Asked Questions
Instant Capacity Software

Table 9-1 E-mail sent by the Instant Capacity software (Continued)

Triggered By	E-mail Message
vPars startup (when the virtual partition has more cores assigned to it than the number of intended active cores for the nPartition)	Information about why the virtual partition is not being allowed to boot is sent to the system-contact, if specified, and root.
icapmodify (when a codeword is applied to a GiCAP member which modifies the number of cores without usage rights on that member, and available sharing rights go negative, triggering a lockout on all groups; or when incompatible hardware is added)	A warning message is sent to the system-contact, if specified, and root, stating that the Group Manager must adjust the number of sharing rights.

If asset reporting is configured, and the system has e-mail connectivity to HP, these messages are sent to HP:

Table 9-2 Asset reporting e-mail sent by the Instant Capacity software

Triggered By	E-mail Message
icapnotify (on demand)	An asset report is sent to the reply address, root, and HP (the asset report sent to HP is encrypted).
System startup and system shutdown	An encrypted asset report is sent to HP.
icapd (daily at noon)	An encrypted asset report is sent to HP.

Does the upgrade of one partition on a server to iCAP v8 mean that every partition must be upgraded?

No, not for basic iCAP functionality. iCAP v8 is compatible with older versions back to v6. Earlier versions of iCAP need to be upgraded, as described in “Upgrading to Instant Capacity versions B.06.x or later (HP-UX)” on page 162. However, in order to use the GiCAP feature, all partitions of a server must be running version 8 of the iCAP software.

Instant Capacity Hardware

Can a faulty cell board be replaced with an inactive Instant Capacity cell board?

Yes. This is accomplished by first deactivating the failed cell board via the parmodify command and rebooting, followed by activating the inactive iCAP cell board and rebooting. In this situation, it is not necessary to obtain an RTU to activate the cell board.

Global Instant Capacity

Does HP know the configuration of the GiCAP groups?

No. GiCAP group data is stored on the GiCAP Group Manager which runs in the customer's data center. Unless software external to the Instant Capacity software is setup to report this information to HP, it is not available to HP.

Is GiCAP migration supported on a completely unavailable server?

No. In order for migration of usage rights to occur, the GiCAP Group Manager must be able to contact at least one partition on the server.

Frequently Asked Questions
Global Instant Capacity

A

Special Considerations

This appendix covers the following topics:

- “Assumed Values in `icapstatus`” on page 160
- “Upgrading to Instant Capacity versions B.06.x or later (HP-UX)” on page 162
- “Dual Core Support in Instant Capacity Systems” on page 165
- “New Partition Creation and Instant Capacity” on page 166
- “Implications of Removing a Cell from an Instant Capacity System” on page 167
- “Shutting Down a Partition with Instant Capacity Cores” on page 169
- “`par` Commands from PC System Management Station (SMS)” on page 171
- “Instant Capacity Integration with Virtual Partitions (HP-UX only)” on page 172
- “Instant Capacity Compatibility with Processor Sets (HP-UX)” on page 182
- “Configuring E-Mail on Instant Capacity Systems” on page 184
- “Measurement Software on Instant Capacity Systems” on page 192
- “Dynamic Processor Resilience (DPR) (HP-UX)” on page 193
- “Security Related Issues” on page 194

Assumed Values in icapstatus

The `icapstatus` command may make assumptions on the number of active cores and amount of active memory, depending on certain system conditions. If values are assumed, the `icapstatus` command's output contains an asterisk next to the appropriate field.

Assumed Processor Values

Occasionally, the output of the `icapstatus` command may contain an asterisk next to the value in the `Actual Active Cores` field (under the section `Allocation of Instant Capacity Resources among the nPartitions`). The asterisk may appear in the output for the following reasons:

- The absence of Instant Capacity versions 8.x software on a non-local partition
- A non-local partition appears to be active, but the `icapd` daemon is not reporting system information
- A non-local partition was shutdown for an extended period of time with `shutdown` or `reboot`, and the `-R` option was not used (which brings the cells to an inactive state)
- A non-local partition is running an operating system that is not HP-UX or OpenVMS (for example, MS Windows or Linux)

In the above cases, the Instant Capacity software on other partitions assumes that all cores in the non-local partition are active. In addition to the asterisks in the output of `icapstatus`, this can affect the following:

- Temporary capacity consumption
- The ability to change the complex with `parmodify`, `parmgr`, or `parcreate` commands
- Core activation with the `icapmodify` command

NOTE

The number of active cores is always known for a local partition.

Special Considerations
Assumed Values in `icapstatus`

If a non-local partition appears to be inactive, the number of active cores reported by the `icapstatus` command is zero. For example, if the hardware for a non-local partition is inactive, `icapstatus` considers the partition as inactive and reports the number of active cores as zero.

Assumed Memory Values

When a cell board is powered off, no matter if the cell is in the local partition or in a non-local partition, the amount of inactive memory is assumed to be 2 GB and is reported as such by the `icapstatus` command.

An asterisk may appear next to the value of the Inactive Memory field in the `icapstatus` output, section Allocation of Instant Capacity Resources among the nPartitions.

Upgrading to Instant Capacity versions B.06.x or later (HP-UX)

The first time a version of the codeword-based B9073BA Instant Capacity software (B.06.00 or later) is loaded onto a system where the old B9073AA software (version B.03.x through B.05.x) has been in use, the new software requires the system to go through an upgrade process.

This process involves transferring Instant Capacity inventory information from HP to the system through the application of an upgrade codeword. This allows the system (using the B9073BA software) to keep track of the number of components without usage rights.

Prior to December 2003, the Instant Capacity software product (B9073AA) was loaded from Support Plus media and was not present on the 11i v1 and 11i v2 Operating Environment (OE) media. In December 2003, an updated version of the Instant Capacity software product (B9073BA) was placed on the 11i v1 and 11i v2 OE media.

The Instant Capacity versions B.06.x, B.07.x, or B.08.x software (B9073BA) is automatically installed when the HP-UX 11i v1 or 11i v2 OE is installed. When a newer version of the HP-UX 11i v1 or 11i v2 OE is installed in a partition, the Instant Capacity software in the OE is automatically updated in that partition.

After the Instant Capacity software is updated in one partition from an older B9073AA version (B.03.x through B.05.x) to the newer B9073BA version (B.06.00 or later), the Instant Capacity software in all of the system's other partitions needs to be updated before the new software is completely operational. Until that time, the new software does not have visibility of the status of partitions running the old software. As a result, it is likely that exception e-mail will be generated daily from the new software until all updates are completed.

After the installation of new Instant Capacity B9073BA software on the first partition, perform the following steps.

NOTE

The following HP-UX procedures use the obsolete commands, such as `icod_stat` and `icod_modify`, because these commands are common to all versions of Instant Capacity (B.06.x, B.07.x and B.08.x). On version B.08.x, these commands could be `icapstatus` or `icapmodify`, which have identical results.

Step 1. Execute the following command and record the output:
`/usr/sbin/icod_stat -s`

You can copy and paste the output of the `icod_stat -s` command and save it in a text file. You need this information later in **Step 4**.

Step 2. Go to the HP Utility Pricing Solutions web portal:
<http://www.hp.com/go/icap/portal>. Log into the portal and click on the link to get codewords.

Step 3. Click on the **Upgrade Codeword** link to get an upgrade codeword.

Step 4. Supply the requested information from the `icod_stat -s` command output gathered in **Step 1** and get the upgrade codeword from the portal. You need the codeword in the next step.

Step 5. Apply the upgrade codeword, generated by the Utility Pricing Solutions portal, to the system by executing:
`/usr/sbin/icod_modify -C codeword`

Where `codeword` is the upgrade codeword that was supplied by the portal in **Step 4**. This is easily accomplished by copying and pasting the codeword (that is generated by the portal) to the system where you are executing the `icod_modify -C codeword` command. The upgrade codeword needs to be applied only once on the entire system.

Step 6. Install/upgrade all other partitions with the Instant Capacity B9073BA software (version B.06.00 or later). This software is on the 11i v1 and 11i v2 OE media, starting with the December 2003 media, and is automatically installed when either the 11i v1 or 11i v2 OE is installed. The software is also available from the HP web site:
<http://www.hp.com/go/softwaredepot> (search for “B9073BA”). If you do not complete this step, in the absence of other information, the Instant Capacity software assumes that all partitions that have not been

Special Considerations

Upgrading to Instant Capacity versions B.06.x or later (HP-UX)

upgraded are fully active. If all partitions in a system are not upgraded, the Instant Capacity software may determine the system to be in an exception state.

Step 7. Execute the following command:

```
/usr/sbin/icod_stat
```

Inspect the `icod_stat` command output for the line that indicates the Exception status (near the top of the output). If it displays “No exception”, your system is in compliance. Inspect the remainder of the output to see the distribution of your active and inactive cores in the system and modify it using `/usr/sbin/icod_modify` if you want to make changes.

Step 8. If the Exception status in **Step 7** indicates that there are more cores, cells, or memory active than expected, you need to deactivate the appropriate number of each component in order to bring the system into compliance with the Instant Capacity contract.

Step 9. From the output in **Step 7**, verify that the correct system-contact information is specified. If necessary, update the contact information by executing:

```
/usr/sbin/icod_modify -c contact_e-mail_address
```

Step 10. Ensure you have installed all of the required HP-UX patches on each partition. See “Required Patches for HP-UX 11i v1” on page 27 for details. If necessary, obtain missing patches from the web site: <http://us-support2.external.hp.com>. Detailed instructions on installing each patch are available on this web site.

Step 11. *If e-mail connectivity is required (when upgrading to B.06.x), or if asset reporting is being used with B.07.x or later versions:* Execute the following command:

```
/usr/sbin/icod_notify reply_address
```

This command verifies that your `sendmail` configuration is capable of sending e-mail messages to the `hp.com` domain. The `icod_notify` command needs to be executed with an e-mail address as an argument. The e-mail address is the address HP uses when responding to the e-mail sent from the Instant Capacity system and is the e-mail address to which the HP acknowledgement message is sent.

Using `elm`, or any e-mail reader, verify receipt of the acknowledgement e-mail from HP. The message should be received within one hour.

Dual Core Support in Instant Capacity Systems

With dual core processing, each cell board has four sockets and each socket accepts a CPU module that contains two processor cores. You can upgrade an Instant Capacity Superdome system to a dual core system by replacing the cell boards and processors. Contact your HP service representative for details on upgrading to dual core processors.

The Instant Capacity software supports dual core processors. The software treats each core individually and allows the following actions at the core level:

- Applying Right to Use (RTU) codewords
- Activating and deactivating
- Load balancing across partitions
- Configuring in virtual partitions

Special Considerations

New Partition Creation and Instant Capacity

New Partition Creation and Instant Capacity

You can assign a cell to an existing partition even if the cell contains cores without usage rights (Instant Capacity processors), as long as there are enough available core, cell and memory usage rights to cover activation of the cell, its memory, and all of the cores on the cell. In this case, it can be verified that the partition has valid Instant Capacity software installed, and that the partition is running an operating system capable of activating and deactivating cores.

However, at the time a new partition is created, these verifications are not possible; therefore, the Instant Capacity software does not allow the partition to be created unless it contains only components with usage rights. That is, new partition creation fails if any of the cell boards contain Instant Capacity components without usage rights.

Implications of Removing a Cell from an Instant Capacity System

The Instant Capacity software tracks the expected number of inactive components (cores, cells, and memory) in a complex and knows the actual number of active and inactive components. The complex is in compliance if the actual number of inactive components meets or exceeds the expected number of inactive components.

The complex is out of compliance if the actual number of inactive components is less than the expected number of inactive components and no temporary capacity exists.

However, a complex can also get out of compliance if a cell is removed from the complex. For example, if a cell contains inactive cores that are contributing to compliance, and the cell is removed, there will be fewer inactive cores on the complex. This may result in the complex being out of compliance and temporary capacity may begin to be debited.

Example A-1

Removing a Cell and Decreasing the Actual Number of Inactive Cores

For example, a complex contains two cells, with two partitions having two inactive and two active cores each. The Instant Capacity software expects the complex to have four inactive cores. If one of the cells (0) experiences a hardware problem, and you remove the cell, the complex is left with only one cell that contains two active and two inactive cores. The complex is now out of compliance because four inactive cores are expected to be in the complex, yet there are only two inactive cores.

Special Considerations

Implications of Removing a Cell from an Instant Capacity System

Table A-1 **Removing a Cell — Decrease Inactive Cores**

State	Partition (Cell) 0	Partition (Cell) 1	Notes
Before Cell 0 is Removed	2 active 2 inactive	2 active 2 inactive	4 inactive cores expected (in compliance)
After Cell 0 is Removed	0 active 0 inactive	2 active, 2 inactive	4 inactive cores expected (out of compliance)

In the above example, all cores in the removed cell are assumed to be active. This causes the complex to be out of compliance as the complex has two more active cores than it has core usage rights. This results in the complex consuming two hours of temporary capacity for each hour that the complex remains in this state. Deactivating another core from Cell 1 decreases the amount of temporary capacity being consumed, but since at least one core must be active per active cell, this complex cannot remain in compliance except through the use of temporary capacity.

Note that removal of a cell, followed by a reboot of the affected partition, does not affect the intended active number for the partition, or the required number of inactive cores which is determined by the overall availability of core usage rights across the complex. During the period when the cell is absent, temporary capacity may be consumed if the number of inactive cores is less than the expected number of inactive cores. Having additional Temporary Instant Capacity allows this system to remain in compliance even in the presence of a cell hardware failure.

Shutting Down a Partition with Instant Capacity Cores

The Instant Capacity software saves information about the number of active cores for each partition and this information expires over time. If the partition is not active (but the hardware is powered up), Instant Capacity software on other partitions assumes that all cores in the inactive partition are active unless it can detect otherwise. See “Assumed Values in *icapstatus*” on page 160 for details of these assumed processor values.

These are the general rules the Instant Capacity software uses:

- If the partition is to be shut down for less than 12 hours, no action is necessary
- If the partition is to be shut down for greater than 12 hours, consider powering the cells off, or shutting the partition down using the **-R** option with the **shutdown** command
- If the partition crashes or shuts down abnormally, reboot the partition within 12 hours or power it down

IMPORTANT

If you shut down a partition for 24 hours or more, you should also power it off to avoid additional charges. To power off the partition, execute the **PE** command from the system MP.

On HP-UX systems, always use the **shutdown** command when shutting down or rebooting an Instant Capacity partition. See the HP-UX manpage *shutdown* (1M) for information on the **shutdown** command.

On OpenVMS systems, always use the **sys\$system:shutdown.com** procedure when shutting down or rebooting an Instant Capacity partition.

Instant Capacity and Re-Initializing the nPartition (Genesis Partitions)

Any use of the CC command at the service processor level has the potential to overwrite the Instant Capacity configuration, and is therefore not recommended on Instant Capacity systems. In particular, creating a Genesis Partition on an Instant Capacity system is not recommended because it causes the system to be out of compliance.

If you clear the configuration of a system with Instant Capacity components (components without usage rights), you must acquire and apply a codeword that will restore a lost iCAP configuration to remain in compliance with your contract. Since the codeword can only be generated using a recent audit snapshot of the system, this means that you should generate an audit snapshot with `icapstatus -s` before doing the reset or, if asset reporting is configured, ensure that a recent asset report has been sent to the portal.

par Commands from PC System Management Station (SMS)

Use of par commands (such as `parmodify` or `parcreate`) can cause changes to a complex that affect the Instant Capacity state of the complex. Therefore, if a par command is executed on an Instant Capacity complex from a PC System Management Station (SMS), the command must be directed towards a HP-UX partition in order to succeed, in particular so that the Instant Capacity software can authorize the change. The par commands support this functionality through the `-h` option.

For more information, see the HP-UX *parmodify* (1M), *parcreate* (1M), and *parremove* (1M) manpages.

Instant Capacity Integration with Virtual Partitions (HP-UX only)

Overview

Instant Capacity may be present on systems or partitions where virtual partition technology is employed. In a virtual partition environment, cores that are not assigned to any virtual partition are considered inactive (in addition to other classes of inactive cores). Unassigned cores can be assigned (activated) or deassigned (deactivated) using either the `icapmodify` command or the `vparmmodify` command, depending on the type of adjustment needed, the version of vPars being used, and the level of logging or reporting desired.

One important consideration is that `vparmmodify` can be used to activate or deactivate cores in other virtual partitions within the nPartition; `icapmodify` only activates or deactivates cores within the current virtual partition (the partition where the command is invoked).

Another consideration is that core assignment via the `vparmmodify` command does not result in logging of the activation, e-mail configuration change notification, or transmission of an asset report to HP.

For versions of vPars before A.04, HP recommends using the `icapmodify` command when activating or deactivating cores in a virtual partition. This is the best way to ensure that the complex remains in a compliant state.

NOTE

Deferred activations and deactivations are not supported in any vPar environment.

The Instant Capacity software interacts with virtual partitions (vPars) software to varying degrees depending on the version of vPars that is being used. This feature is not relevant to OpenVMS Integrity.

For HP-UX 11i v2 systems, the required version of vPars software is A.04.01 or greater. That version, combined with Instant Capacity, is referred to as the “integrated virtual partition environment”, since it

Special Considerations
Instant Capacity Integration with Virtual Partitions (HP-UX only)

allows for the best coordination between Instant Capacity software and vPars software, making it less likely for a complex to be misconfigured or out of contractual compliance.

For HP-UX 11i v1 systems, the required version of vPars software is A.02.03 or greater, but version A.04 is not available for that platform. When A.02 or A.03 versions of vPars are used (on HP-UX 11i v1), the combination is referred to as a “compatible virtual partition environment” because the Instant Capacity software co-exists with the virtual partition software, with a lesser degree of coordination between the two products.

The Instant Capacity software must be installed on all virtual partitions in an Instant Capacity system.

See the *Installing and Managing HP-UX Virtual Partitions* manual for details of virtual partitions. This manual can be found on the HP web site: <http://docs.hp.com>

Special Considerations

Instant Capacity Integration with Virtual Partitions (HP-UX only)

Instant Capacity Integration with vPars — Supported Hardware Platforms

Table A-2

Instant Capacity Integration with vPars — Supported Hardware Platforms

Software and Version	Operating System Version	Supported Hardware Platforms	Requirements
iCOD B.11.23.08.00.01 (B9073BA)	HP-UX 11i v2	hp Integrity servers: <ul style="list-style-type: none">• Superdome• rx8620• rx7620 hp 9000 servers: <ul style="list-style-type: none">• Superdome• rp8420• rp8400• rp7420• rp7410	vPar software version A.04.01 or greater is required
iCOD B.11.11.08.00.01 (B9073BA)	HP-UX 11i v1	hp 9000 servers: <ul style="list-style-type: none">• Superdome• rp8420• rp8400• rp7420• rp7410	vPar software version A.02.03 or greater is required

Special Considerations
Instant Capacity Integration with Virtual Partitions (HP-UX only)

Table A-2 Instant Capacity Integration with vPars — Supported Hardware Platforms (Continued)

Software and Version	Operating System Version	Supported Hardware Platforms	Requirements
iCAP 8.0 (BA484AA)	hp OpenVMS I64 V8.3	hp Integrity servers: <ul style="list-style-type: none"> • Superdome • rx8640 • rx8620 • rx7640 • rx7620 	vPar software is not supported

Special Considerations

Instant Capacity Integration with Virtual Partitions (HP-UX only)

Integrated Virtual Partition Environment

Activation and Deactivation of Cores

When using vPars version A.04.01 or greater, the `icapmodify` command must be used to modify processing capacity when you are making any adjustment to an nPartition or to multiple nPartitions:

- When you execute the `icapmodify` command to deactivate a core, a check is made to see if the request can be satisfied. If so, the local hard partition's intended active number is decreased and the appropriate number of cores are removed from the local virtual partition.
- When you execute the `icapmodify` command to activate a core, a check is made to see if the request can be satisfied. If so, the local hard partition's intended active number is increased and the appropriate number of cores are added to the local virtual partition.

If you are adjusting core assignments across virtual partitions in a single nPartition, you use the `vparmmodify` command for the best coordination between the Instant Capacity software and the vPars software, and for optimized performance. The `vparmmodify` command is the fastest and most efficient way to adjust capacity within virtual partitions of a single hard partition, but it does not affect the intended active count for the nPartition and it therefore cannot be used to migrate unused capacity either to or from other nPartitions:

- When you execute the `vparmmodify` command to deactivate a core, there is no authorization required from the Instant Capacity software.
- When you execute the `vparmmodify` command to activate a core, it checks with the Instant Capacity software to determine how many cores are available for activation. This number is calculated as the difference between the local hard partition's intended active number and the total number of cores assigned to the vPars database. If enough cores are available to meet the request, the proper number of cores are added to the local virtual partition.

Whether you are activating or deactivating cores, the `vparmmodify` command adjusts only the number of dynamic cores, and it does not explicitly identify specific cores.

Boot Time Compliance

In the integrated virtual partition environment, a compliance check is performed whenever a virtual partition is booted. If the total number of cores assigned to all virtual partitions in the current vPar database exceeds the nPartition's intended active core count, the Instant Capacity software notifies the vPar monitor, and the monitor prevents any virtual partition from booting until the user performs a hard partition boot and modifies either the vPar configuration or the Instant Capacity intended active count for the nPartition.

Example A-2

vPar Boot Time Compliance Message

To: root@par1.yourorg.com
Subject: vPar Boot Time Compliance

This message is being sent to inform you that a vpar is not being allowed to boot because doing so would take this complex out of compliance from an Instant Capacity perspective. The number of cores assigned to this vPar database (/stand/vpdb) exceeds the number of intended active cores by 1. To correct this problem, boot this partition back into an nPartition and modify the vPars assigned to this database or modify the number of intended active cores for this nPartition.

Compatible Virtual Partition Environment

Activation and Deactivation of Cores

The Instant Capacity software co-exists with vPars versions less than A.04.01. In this environment, HP recommends using the `icapmodify` command when modifying processing capacity in a virtual partition. This is the best way to ensure that the complex remains in a compliant state.

To co-exist with vPars, the Instant Capacity software modifies processing capacity using the `vparmmodif` command. When you execute the `icapmodify` command to deactivate a core, it determines how many cores in the local virtual partition are unbound. If enough unbound cores exist to satisfy the request, the appropriate `vparmmodif` command is executed, and the proper number of unbound cores are removed from the local virtual partition.

Special Considerations

Instant Capacity Integration with Virtual Partitions (HP-UX only)

WARNING

The **icapmodify** command should not be used in a compatible virtual partition environment to deactivate cores if processor sets (Psets) are being used. The **icapmodify** command utilizes the **vparmodyf** command which does not recognize Psets. Using the **icapmodify** command to deactivate a core may cause an unintended core to be removed from a Pset.

When you execute the **icapmodify** command to activate a core, it determines how many cores are available for activation. If enough cores are available to meet the request, the appropriate **vparmodyf** command is executed, and the proper number of unbound cores are added to the local virtual partition.

Whether you are activating or deactivating cores, the (appropriate) **vparmodyf** command adjusts only the number of unbound cores, and it does not explicitly identify specific cores, or affect the number of bound cores.

Temporary Capacity and Virtual Partitions

If temporary capacity is being consumed in any virtual partition environment (having been previously authorized using **icapmodify -a n -t**), deactivating a core with the **vparmodyf** command temporarily reduces the consumption of temporary capacity. A subsequent core activation using **vparmodyf** increases consumption of temporary capacity, assuming that this activation results in there being more active cores than available core usage rights. Use **icapmodify -d** to stop the use of temporary capacity. It is not necessary to use the “-t” option when using the “-d” option.

Special Considerations
Instant Capacity Integration with Virtual Partitions (HP-UX only)

**Example Output of
icapstatus on a
Partitionable
System
Containing vPars**

/usr/sbin/icapstatus

```
Software version: B.08.00.01
System ID: z006
Serial number: USR4020003
Product number: A6093A
Unique ID: Z3e0ec8e078cd3c7b
System contact e-mail: mjones@corp.com
From e-mail: Set to the default ('adm')
Asset reporting: on
Temporary capacity warning period: 15 days
Exception status: No exception
```

Local Virtual Partition Status

Total number of assigned cores:	4
Number of active assigned cores:	4
Number of inactive assigned cores:	0
Additional cores that can be assigned with current usage rights:	2
Number of cores that could be assigned with additional usage rights:	1
Number of cores that can be assigned with temporary capacity:	0
Number of cores that are deconfigured or attached to inactive cells:	0

Local nPartition Status

Total number of configured cores:	8
Number of Intended Active cores:	3
Number of active cores:	5
Number of inactive cores:	3

Instant Capacity Resource Summary

Number of cells without usage rights:	0
Number of inactive cells:	0
Amount of memory without usage rights:	0.0 GB
Amount of inactive memory:	0.0 GB
Number of cores without usage rights:	4
Number of inactive cores:	6
Number of cores that must be deactivated (insufficient usage rights):	0
Temporary capacity available:	0 days, 0 hours, 0 minutes

Special Considerations

Instant Capacity Integration with Virtual Partitions (HP-UX only)

Allocation of Instant Capacity Resources among the nPartitions

nPar ID	Intended		Actual		Memory	Cells	iCAP	nPar	Name
	Total Cores	Active Cores	Active Cores	Inactive Cores					
0	4	4	4	0	0.0 GB	0	Yes	zoo0	
1	4	4	4	0	0.0 GB	0	Yes	zoo1	
2	8	4	4	4	8.0 GB	1	Yes	zoo2	
3	4	0	4	0	0.0 GB	0	Yes	zoo3a	
4	0	4	4	0	0.0 GB	0	Yes	zoo5	
5	2	2	4	2	0.0 GB	0	Yes	zoo7	
6	3	3	4	1	0.0 GB	0	Yes	zoo6	(local)
8	0	1	4	3	0.0 GB	0	Yes	zoo8	
9	0	4	4	0	0.0 GB	0	Yes	zoo9	
10	0	4	4	0	0.0 GB	0	Yes	zoo10	
11	0	4	4	0	0.0 GB	0	Yes	zoo11	
12	0	4	4	0	0.0 GB	0	Yes	zoo12	
13	0	4	4	0	0.0 GB	0	Yes	zoo13	
N/A	8	N/A	N/A	8	4.0 GB	2	N/A	Unassigned Cells	

Static Virtual Partitions

If a virtual partition is static (that is, the resources cannot be migrated, added, deleted, or modified) and you attempt to activate or deactivate cores, the Instant Capacity software displays a message indicating that the configuration cannot be modified.

NOTE

The `icapstatus` command's output indicates that the number of cores that can or could be assigned (to the local virtual partition) is zero if the static resource attribute for the local virtual partition is set.

LPMC Deactivations in Virtual Partitions

In a vPar environment, if the Low Priority Machine Check (LPMC) monitor deactivates a core, it automatically replaces the failing core with an Instant Capacity core from the free pool, assuming there is one available.

The failing core remains in the virtual partition until either the virtual partition or the virtual partition monitor is rebooted. (In the compatible virtual partition environment, rebooting the virtual partition monitor is necessary if a bound core in the virtual partition fails.)

More information about LPMC in vPars can be found in whitepapers on <http://docs.hp.com> (search for “LPMC”).

NOTE

vPars version A.03.01 (or later) is required for automatic replacement of a failed core by the LPMC monitor.

Instant Capacity Compatibility with Processor Sets (HP-UX)

Overview

The Instant Capacity software successfully co-exists with processor sets (Psets).

To co-exist with Psets, the Instant Capacity software only activates and deactivates cores in the default processor set. Cores in non-default processor sets are not activated or deactivated.

NOTE

There must be at least one core in the default processor set. The last remaining core in the default processor set is unavailable for deactivation.

Scope of the Instant Capacity Software Interacting with Psets

The Instant Capacity software does not provide any additional functionality to specifically support adding or removing cores from a specific Pset.

Psets on nPars

In an nPar environment where Psets are present, the Instant Capacity software only activates and deactivates cores in the default Pset.

Cores can be manually migrated to the default Pset for purposes of deactivation, or from the default Pset to other Psets after activation.

Psets on vPars

In a vPar environment, the Instant Capacity software passes the request for a core activation or deactivation to the `vparmodify` command.

Special Considerations
Instant Capacity Compatibility with Processor Sets (HP-UX)

With vPars version A.04.01 or greater, vPars is Pset-aware to an extent. When adding cores to a running vPar, a core is always added to the default Pset; thereafter, it may be moved to another Pset. When removing cores, `vparmody` will choose cores from the default Pset first, and if not enough exist in the default Pset to satisfy the request, `vparmody` chooses the remaining cores arbitrarily, without regard to Pset membership.

With vPars versions less than A.04, no special consideration is given to Psets from the `vparmody` command's perspective. Therefore, when using vPars, cores in non-default Psets must be bound cores. Otherwise, a core designated for deactivation by `vparmody` may be selected from an unexpected Pset.

Configuring E-Mail on Instant Capacity Systems

E-Mail Requirements

Previous versions of the Instant Capacity software required e-mail connectivity to HP in order to send asset reports as encrypted e-mail messages. Starting with version B.07.x, Instant Capacity software does not require e-mail connectivity or asset reporting, however, you may choose to configure it because it can be useful for viewing complex-wide asset information at the HP Utility Pricing Solutions portal (<http://www.hp.com/go/icap/portal>).

NOTE

E-mail asset reporting is set to “on” by default when the Instant Capacity software is installed. You turn asset reporting on or off with the `icapnotify -a` command/option. You can view the current setting of e-mail asset reporting in the Asset reporting field, near the beginning of the `icapstatus` command’s output.

For e-mail connectivity, the requirements are:

- The Instant Capacity system/partition should have `sendmail` installed and configured such that it has the ability to send e-mail to the `hp.com` domain.
- The domain name in the Instant Capacity FROM e-mail address, for the e-mail sent from the Instant Capacity system to HP, must be DNS resolvable by HP. See “Configuring Instant Capacity’s FROM E-mail Address” on page 189 for details.

IMPORTANT

On OpenVMS systems, SMTP mail must be configured for e-mail connectivity. See the documentation for the TCP/IP provider for information on configuring SMTP mail.

IMPORTANT

The e-mail is bounced/rejected by the mail servers at HP if the domain name in the `FROM` address, for the e-mail sent from the Instant Capacity system to HP, is not DNS resolvable by HP. Also, since asset reports are encrypted and must be decrypted at the HP portal, the decryption process may not work correctly if outgoing e-mail sent from your system is automatically modified in any way, for example, to include a privacy notice.

Note that the `sendmail` configuration and routing may vary, but the system must have the ability to send e-mail to the `hp.com` domain.

The ability to receive e-mail from HP is optional, but you may find it useful for testing the capability of sending e-mail to HP. For more information see “Configuring Your Server to Send but Not Receive E-Mail” on page 190. Refer to the HP-UX `sendmail(1M)` manpage for more information on `sendmail`.

`sendmail` is part of the HP-UX core and is installed with the HP-UX operating system. However, a `sendmail` configuration process needs to be followed to complete its installation. For information, refer to the chapter titled *Installing and Administering sendmail*, in the appropriate documentation:

- For HP-UX 11i v1: *Installing and Administering Internet Services* (`B2355-90685`)
- For HP-UX 11i v2: *Installing and Administering Internet Services* (`B2355-90774`)

You can retrieve the above documentation from the HP web site:

<http://docs.hp.com>

Select:

Networking and Communications -> Internet Services

to access either of the documents.

On Partitionable Systems

If asset reporting is desired, configure e-mail connectivity on each partition. This makes it easier for you to later redistribute cores across partitions (that is, load balance). See “Load-Balancing Active Cores” on page 73 for details.

E-Mail Configuration

Before you Start

If you decide to enable e-mail connectivity, your Instant Capacity system must be network accessible to HP mail servers that are outside your company's firewalls. If your Instant Capacity system is on an isolated network, e-mail from the system does not reach HP. This causes your system to be out of compliance with your Instant Capacity contract if you are using temporary capacity (TiCAP).

Sendmail

sendmail is the application used by the Instant Capacity software to send encrypted mail messages from your system to HP. The sendmail daemon, if running, can also be used to receive e-mail. For the purposes of this e-mail configuration, only the ability to send e-mail is required.

Mail applications invoke sendmail to send e-mail. The configuration file, /etc/mail/sendmail.cf, offers tremendous flexibility.

Overview of E-mail Routing Across the Internet

When sendmail is invoked by the Instant Capacity software to send e-mail to HP, sendmail determines where it should initially send the e-mail (the first hop). Mail often goes through multiple systems (hops) before it reaches the final destination. To determine the first hop for the e-mail, sendmail uses one of the following:

- The e-mail is routed to a mail relay host if it is configured in the /etc/mail/sendmail.cf configuration file. This is the easiest implementation and can be done with just a one line change (DS) to the default /etc/mail/sendmail.cf file.

Note that the relay host must be configured to properly route (forward) the mail to the final destination.

- DNS MX records - this method requires that the Instant Capacity system be in an environment (network) where DNS (Domain Name Server) is operating and properly configured. sendmail on the system queries a DNS server for the name of the mail server to forward the e-mail to (for the first hop) in order for the e-mail to reach the final destination (hp.com).

In all cases, the following requirements must be met:

Special Considerations
Configuring E-Mail on Instant Capacity Systems

- HP's mail servers receiving mail expect the host (the mail server in the last hop before reaching HP) to be properly registered in DNS. Otherwise the HP mail server rejects or "bounces" the e-mail.
- The 'From' field (e-mail address) in the e-mail message must be known by the receiving mail server (that is, the hostname is registered in DNS and advertised on the internet). Otherwise, the receiving mail server at HP rejects the mail. This field in the e-mail can be configured with a simple one line modification (DM) to the `/etc/mail/sendmail.cf` file.

In some DNS environments, no changes to the default `/etc/mail/sendmail.cf` file may be needed to properly route e-mail from the Instant Capacity system to HP.

- In some environments, configuring your system to properly send e-mail from the system to HP can require as little as a two line edit (or none) to the `/etc/mail/sendmail.cf` file. Configuring mail, including sendmail and DNS configurations, is usually handled by the IT team in most organizations.

Example A-3

Example Edit to Sendmail Configuration (`/etc/mail/sendmail.cf`)

```
DMmy_company.com
DSmailhub.my_company.com
```

This example assumes the following:

- The Instant Capacity system's hostname is: `myICAPsystem.my_site.my_company.com`
- The From field of the e-mail is set to `my_company.com` rather than the exact hostname of the Instant Capacity system. This is because most organizations do not advertise the names of their internal servers to the internet; however, they do advertise a few (select) high level domain names to the internet.
- The Instant Capacity system is not advertised to the internet but hostname `mycompany.com` is advertised and reachable from the internet
- E-mail is forwarded from the system to a mail relay host called `mailhub`. The mail server called `mailhub` may either be directly connected to the internet and send the e-mail directly to HP, or it may forward the e-mail to another mail server on its way to HP.

Special Considerations

Configuring E-Mail on Instant Capacity Systems

NOTE	Any bounced Instant Capacity e-mail messages are sent to the <code>adm</code> mailbox.
-------------	--

Steps to Confirm or Diagnose E-mail Configuration

After you have configured your Instant Capacity system to send e-mail over the internet you can use the following steps to confirm the e-mail configuration or to aid in debugging the configuration:

1. Send an e-mail message from your system to an e-mail address in the same domain (intranet) and confirm receipt of the e-mail message.
2. Send an e-mail message from your system to an e-mail address outside of your domain (to the internet, for example, to a yahoo or hotmail e-mail address) and confirm receipt of the e-mail message.
3. Send an e-mail message from your system to someone at HP (for example, a HP representative in a local account team) and confirm the person at HP received the e-mail message.
4. As root, execute the command:
`/usr/sbin/icapnotify <reply_address>`
5. If the previous steps are all successful, but asset reports are still not visible at the HP portal, examine your e-mail configuration to determine if outgoing messages are automatically being modified or appended, for example, to include something like a privacy notice. Additions or modifications to encrypted asset reports may cause them to be rejected by the portal.

The command in **Step 4** sends an e-mail message to HP's audit application. HP sends a confirmation e-mail message to the `reply_address`. Receipt of the confirmation e-mail message confirms successful e-mail configuration.

Configuring Instant Capacity's FROM E-mail Address

One of the e-mail requirements of the Instant Capacity program is that the FROM e-mail address, on e-mail messages sent by the Instant Capacity software from your system, must be DNS resolvable.

The Instant Capacity software uses `adm@localhost.domain` as the default FROM e-mail address (where `localhost` is the hostname of your system and `domain` is its DNS domain). If the default FROM e-mail address is undesirable, you can configure the Instant Capacity software to use a FROM address you specify.

Configuring a Specified FROM Address

To configure your specified Instant Capacity FROM e-mail address, execute the following command:

`/usr/sbin/icapmodify -f from_address`

You can verify the configured Instant Capacity FROM e-mail address by using the `/usr/sbin/icapstatus` command.

After you have configured a specified FROM e-mail address, the Instant Capacity software uses it on all subsequent e-mail messages sent from your system.

Reverting to the Default FROM Address

If you have specified an Instant Capacity FROM e-mail address and you want to revert to the default FROM e-mail address (`adm@localhost.domain`), execute the following command:

`/usr/sbin/icapmodify -f ""`

Configuring Your Server to Send but *Not* Receive E-Mail

For security reasons, some organizations do not wish to allow incoming mail. If you want your Instant Capacity system to be capable of only sending e-mail, and not receiving e-mail, complete the following configuration procedure:

Step 1. To prevent the `sendmail` daemon from starting up again when your system reboots, edit the `/etc/rc.config.d/mailservs` file, changing the value of `SENDMAIL_SERVER` to 0:

```
vi /etc/rc.config.d/mailservs

#####
# Mail configuration.  See sendmail(1m) #
#####

#
#  BSD's popular message handling system
#
#  SENDMAIL_SERVER:      Set to 1 if this is a mail server
#                      and should run the sendmail deamon.
#  SENDMAIL_SERVER_NAME: If this is not a mail server, but a
#                      client being served by another
#                      system, then set this variable to
#                      the name of the mail server system
#                      name so that site hiding can be
#                      performed.
#
#export SENDMAIL_SERVER=0
#export SENDMAIL_SERVER_NAME=
```

Step 2. To immediately stop the server from receiving e-mail, kill the active `sendmail` daemon by executing the following command:

```
/sbin/init.d/sendmail stop
```

Testing E-Mail Transmission of the Asset Report

NOTE

The following procedure assumes your Instant Capacity system is capable of sending internet e-mail.

Execute the following command to send your asset report, by e-mail, to HP:

`/usr/sbin/icapnotify <reply_address>`

The specified reply_address should receive an acknowledgment e-mail message from HP confirming the receipt of your asset report. Use an e-mail client to verify the acknowledgement e-mail message from HP to the reply_address.

Measurement Software on Instant Capacity Systems

Instant Capacity systems inherently have fewer active cores than the total number of cores in the system. This fundamental difference between the number of active cores and the total number of cores can cause some processor measurement products and utilities to report incorrect information. Additionally, when a core is dynamically activated, some software products must recognize the change in the number of active cores in order to report correct processing information.

OpenView Measurement Products

OpenView measurement products, such as MeasureWare and GlancePlus, *must* be version C.02.60 or later to provide correct measurements. Earlier versions of the OpenView measurement products may not work correctly on Instant Capacity systems.

On hp Integrity Superdome Systems

On hp Integrity Superdome systems, HP recommends updating to the GlancePlus Pak version C.03.20 or later.

Other Measurement Software

Please check with your measurement software vendor to ensure their software works properly on Instant Capacity systems and update the measurement software versions as needed.

Dynamic Processor Resilience (DPR) (HP-UX)

The LPMC monitor, within the Support Tools Manager (STM) diagnostics, generates Information events for all cache errors that are detected. After three errors (Threshold) have been detected on a processor in 1440 minutes, or a 24-hour period of time (Period), the monitor deactivates that particular processor, marks it for deconfiguration on the next system reboot, and generates a SERIOUS event. After the failed processor is deactivated, the LPMC monitor attempts to activate one of the inactive Instant Capacity processors, if any are available. This method ensures the processing power of the system is unchanged.

A default value of “three” is assigned to Threshold, except for the PCX-W+ family of processors, which has a value of “five” assigned. The default value assigned to a Period is 1440 minutes, or 24 hours, in all possible processor configurations.

An inactive processor under warranty or support automatically replaces a failed processor. HP also services and replaces any failed processor.

Monarch Processors

See “Failed Monarch Processors (HP-UX only)” on page 81 for details on replacing failed monarch processors.

Security Related Issues

Customer protections which iCAP assumes to be in place

iCAP commands provide system status information and facilitate system configuration modification, and are therefore executable only by personnel with root level access. An assumption is made that there exist administrative policies which exercise the appropriate degree of control over root level access.

Disabling the iCAP daemon (HP-UX)

The iCAP daemon (icapd) can be disabled by commenting out its entry in the /etc/inittab system file, resetting the init task (init -q), and killing icapd via kill -9 or kill -s SIGTERM.

Note that disabling the daemon in this way will have the effect that other partition management software will not be able to determine if the system contains iCAP components and will, as a result, refuse to manage any components that are present.

Customer Security Requirements

The Instant Capacity software is designed to provide maximum protection for sensitive customer information, and follows these customer security requirements:

- Sensitive customer data (names, phone numbers, e-mail addresses, hostnames, IP addresses) is not transmitted to HP.
- There are no transmissions of authentication credentials in clear (non-encrypted) text.
- Non-superuser access to iCAP commands and data is not allowed.
- Confidential information is encrypted when transmission is required.
- Appropriate protections are accorded to confidential data and authentication credentials.

Security Tuning Options

iCAP asset reporting (via e-mail to HP) is optional, but is turned on by default. Customers can disable asset reporting by executing the `icapnotify -a off` command.

Special Considerations

Security Related Issues

B

Considerations for OpenVMS Systems

This appendix covers the following topics:

- “CLI Support on OpenVMS” on page 198
- “DCL Commands” on page 200
- “Special OpenVMS-Specific Features and Considerations” on page 208
- “Restrictions” on page 209

CLI Support on OpenVMS

OpenVMS provides a CLI command interface to the Instant Capacity software. The HP-UX command syntax can be implemented using foreign command symbols. The OpenVMS DCL **ICAP** command provides DCL command support.

HP-UX Style Commands

The HP-UX command syntax can be used on OpenVMS systems by defining foreign command symbols to the iCAP images. Add the three symbol declarations below to your **LOGIN.COM** file or to the **SYLOGIN** file to define commands that use the HP-UX syntax.

```
$ icapmodify ::= $ICAP MODIFY
$ icapnotify ::= $ICAP NOTIFY
$ icapstatus ::= $ICAP STAT
```

Command options are specified as described in the HP-UX manpages for each command.

OpenVMS Command Mapping

The following table shows the mapping of the HP-UX iCAP commands and their OpenVMS equivalents.

Table B-1**OpenVMS Command Mapping**

HP-UX Style	OpenVMS Style
icapstatus	icap show status
icapstatus -s	icap show status/snapshot
icapmodify -C <codeword>	icap apply codeword "codeword"
icapmodify -c <contact>	icap set email/contact="address"
icapmodify -f <from>	icap set email/from="address"
icapmodify -i <system_id>	icap set system_id "id"

Table B-1

OpenVMS Command Mapping (Continued)

HP-UX Style	OpenVMS Style
icapmodify -r	icap reconcile
icapmodify -w <warning>	icap set warning_days "days"
icapmodify -a	icap activate /cpus=/defer/ticap
icapmodify -d	icap deactivate /cpus/defer
icapmodify -s	icap set active_cpus n
icapnotify -a	icap set asset/state=on off
icapnotify -n	icap set notification/state=on off

DCL ICAP Command

The ICAP command supports six command options to perform iCAP operations on OpenVMS systems.

DCL Commands

ICAP Activate

Name	ICAP Activate - Immediately activates additional cores on the system. See the HP-UX manpage for <code>icapmodify -a</code> .
Format	<code>ICAP ACTIVATE /CPU=n [qualifiers]</code>
Qualifiers	<code>/CPU=n</code> (Required) Specifies the number of additional cores to activate.
	<code>/Defer</code> Defers the activation until the next reboot. See the HP-UX <code>icapmodify</code> manpage for the <code>-D</code> option.
	<code>/TICAP</code> Authorize the use of temporary capacity to satisfy this activation request. See the HP-UX <code>icapmodify</code> manpage for the <code>-t</code> option.

ICAP Apply

Name	ICAP Apply - Apply an iCAP codeword. See the HP-UX manpage for <code>icapmodify -C</code> .
Format	<code>ICAP APPLY "codeword"</code>
Parameter	<code>"codeword"</code> An iCAP codeword obtained from the HP Utility Pricing Solutions portal. The codeword should be enclosed in quotation marks.

ICAP Deactivate

Name	ICAP Deactivate - Deactivates cores on the system. See the HP-UX manpage for <code>icapmodify -d</code> .				
Format	<code>ICAP DEACTIVATE /CPU=n [qualifiers]</code>				
Qualifiers	<table><tr><td><code>/CPU=n</code> (Required)</td><td>Specifies the number of cores to deactivate.</td></tr><tr><td><code>/Defer</code></td><td>Defers the deactivation until the next shutdown. See the HP-UX <code>icapmodify</code> manpage for the <code>-D</code> option.</td></tr></table>	<code>/CPU=n</code> (Required)	Specifies the number of cores to deactivate.	<code>/Defer</code>	Defers the deactivation until the next shutdown. See the HP-UX <code>icapmodify</code> manpage for the <code>-D</code> option.
<code>/CPU=n</code> (Required)	Specifies the number of cores to deactivate.				
<code>/Defer</code>	Defers the deactivation until the next shutdown. See the HP-UX <code>icapmodify</code> manpage for the <code>-D</code> option.				

ICAP Reconcile

Name	ICAP Reconcile - Activates or deactivates cores (subject to compliance limits) to bring the system to a state where the intended active number of cores are active. See the HP-UX manpage for <code>icapmodify -r</code> .
Format	<code>ICAP RECONCILE</code>

ICAP Set

Name ICAP Set - Sets various iCAP management variables.

Format ICAP SET *parameter* [*qualifiers*]

Parameter Options ACTIVE_CPU

Sets the number of active cores and the number of intended active cores. See the HP-UX *icapmodify* manpage *-s* option.

Format

ICAP SET ACTIVE_CPU *count*

Parameter

count: the number of cores to set active in the npartition.

ASSET

Sets the asset reporting e-mail on or off. See the HP-UX *icapnotify* manpage *-a* option.

Format

ICAP SET ASSET [*qualifier*]

Qualifiers

/STATE=*state*: specify ON or OFF for the state qualifier value.

EMAIL

Sets the system contact e-mail addresses. See the HP-UX *icapmodify* manpage *-c* option.

Format

ICAP SET EMAIL *qualifiers*

Qualifiers

/CONTACT: the e-mail address that will receive the configuration change notifications and exception reports.

/FROM: the from address for the e-mail sent from the iCAP system.

Considerations for OpenVMS Systems
DCL Commands

NOTIFICATION

Sets the iCAP change configuration e-mail notifications on or off. See the HP-UX `icapnotify` manpage `-n` option.

Format

`ICAP SET NOTIFICATION [qualifier]`

Qualifiers

`/STATE=state`: specify ON or OFF for the state qualifier value.

SYSTEM_ID

Sets the system identification used for iCAP asset reporting. See the HP-UX `icapmodify` manpage `-i` option.

Format

`ICAP SET SYSTEM_ID "id"`

Parameter

id: A user-defined string to identify this system when tracking or reporting usage. Specify a null string ("") to set the system id to the default value. The default value is the local hostname.

WARNING_DAYS

Sets the temporary capacity warning period to the number of days specified. See the HP-UX `icapmodify` manpage `-w` option.

Format

`ICAP SET WARNING_DAYS days`

Parameter

days: the number of days of temporary capacity left to begin sending temporary capacity expiration warning e-mail to the system contact.

ICAP Show

Name	ICAP Show - Show the status and settings of the iCAP software on the OpenVMS system. See the HP-UX <code>icapstatus</code> manpage for more information.
Format	<code>ICAP SHOW STATUS [qualifiers]</code>
Parameter	status Show the iCAP status and system settings to the standard output device.
Qualifiers	/SNAPSHOT Creates a string of snapshot information containing encrypted audit data and displays the string to the standard output device. See the HP-UX <code>icapstatus</code> manpage <code>-s</code> option.

ICAP_SERVER

Name	ICAP_SERVER - iCAP server process.
Description	The ICAP_SERVER process performs the same functions as the <i>icapd</i> daemon process on HP-UX systems. See the HP-UX <i>icapd</i> manpage for more information. To ensure compliance, the ICAP_SERVER is always running on OpenVMS systems in an iCAP complex.

Special OpenVMS-Specific Features and Considerations

Core Activation and Deactivation

Unlike HP-UX, the OpenVMS operating system provides a user interface to start and stop system processor resources. When the `START /CPU` command is used on an OpenVMS system in a complex containing iCAP resources, the `ICAP_SERVER` validates that the start does not take the complex out of compliance. When the `STOP /CPU` command is used, the CPU may restart at a later time if the intended active cores on the system is above the actual active cores.

IMPORTANT

The `ICAP` command or the corresponding HP-UX foreign commands must be used on OpenVMS systems when stopping and starting in complexes containing iCAP components. Using the `START /CPU` command may result in unintended consequences such as an unexpected usage of temporary capacity or the deactivation of cores on the system or another system in the complex. Using the `STOP /CPU` command can result in an unexpected restart of the core or the unexpected start of a core in another system in the complex.

To start cores on OpenVMS, use the `ICAP ACTIVATE/CPU=` command. To stop cores on OpenVMS, use the `ICAP DEACTIVATE/CPU=` command.

E-mail Considerations

The iCAP software requires that SMTP mail be configured on the OpenVMS system in order to send e-mail to the system contact. Please consult your IP provider's documentation on setting up SMTP mail for more information.

Restrictions

- OpenVMS 8.3 Instant Capacity software does not support HP virtual partitioning (vPars).
- Global Instant Capacity (GiCAP) features are not supported, including the use of the `icapmanage` command.
- There is no internationalization support, only English language support.
- LPMC/HPMC are not available on OpenVMS systems.

C

Instant Capacity HP-UX Manpages

This appendix contains the HP-UX manpages for Instant Capacity commands.

The manpages are:

- “iCAP (5) Manpage” on page 212 — an overview of iCOD commands and their usage
- “icapmanage (1M) Manpage” on page 224 — how to manage Global Instant Capacity (GiCAP) groups
- “icapmodify (1M) Manpage” on page 234 — how to activate and deactivate processors, specify system and configuration information, and apply codewords on iCOD systems
- “icapnotify (1M) Manpage” on page 243 — how to test e-mail connectivity to HP, request a confirmation response e-mail from HP, turn configuration change notification and asset reporting on or off on iCOD systems
- “icapstatus (1M) Manpage” on page 246 — how to display iCOD system status and information
- “icapd (1M) Manpage” on page 257 — daemon that provides the iCOD software with complex-wide configuration information

NOTE

The information contained in the following manpages is current at the time of publication for this manual.

iCAP (5) Manpage

iCAP (5)

NAME

iCAP – Instant Capacity software for HP-UX and OpenVMS

DESCRIPTION

Instant Capacity provides services for instantly increasing or decreasing processing capacity (cores, cells, and memory) on supported HP servers to meet varying system demands. When the processing demand significantly changes, you can execute the *icapmodify* command (see *icapmodify (1M)*) to instantly activate or deactivate cores, or defer an activation or deactivation until the next reboot. The *icapmodify* command can also be used to apply codewords to make Instant Capacity components (inactive cores, cells, or memory purchased without usage rights) available for activation.

Instant Capacity is a part of the HP Utility Pricing Solutions (UPS) program, and was formerly known as iCOD. For detailed information about Instant Capacity, see the HP Instant Capacity User's Guide located at */usr/share/doc/icapUserGuide.pdf*.

Initializing an Instant Capacity Server

Instant Capacity software is installed by HP manufacturing on instantly ignited systems. It can also be installed after downloading from <http://www.hp.com/go/softwaredepot> by searching for the product id B9073BA.

Instant Capacity can send asset reports by e-mail to HP. If enabled, asset reporting allows you to view asset information at the HP Utility Pricing Solutions portal (<http://www.hp.com/go/icap/portal>).

To initialize an Instant Capacity server:

- 1) Execute the *icapmodify -c* command to configure contact information (e-mail address).

- 2) Execute the `icapstatus` (see *icapstatus (1M)*) command to check the current status of the Instant Capacity components and available usage rights on the complex, and to verify that the contact information is set properly.
- 3) If asset reporting is to be used, execute the `icapnotify` command (see *icapnotify (1M)*) to send an asset report to HP, root, and to the specified e-mail address. HP will respond to the asset report by sending a confirmation e-mail to the specified contact e-mail address. Receipt of the confirmation e-mail verifies that e-mail communication with HP is established.

Codewords

Instant Capacity uses codewords for several purposes: to adjust available usage rights for system components, to apply an amount of “temporary capacity” to the system, and to apply “Sharing Rights” to a Global Instant Capacity (GiCAP) Group Manager to enable creation of one or more groups of member servers that can share usage rights.

All types of codewords must be purchased as specific product numbers from HP. After purchase, the codeword (an encrypted string) must be retrieved from the Utility Pricing Solutions web portal and applied to the appropriate system. Codewords are generated specifically for the system for which they were purchased, so you must always specify at least the system serial number and the purchase order number in order to retrieve a codeword from the portal. Application and use of GiCAP codewords are different from other iCAP codewords and are described in the section “GiCAP Sharing Rights”.

Prior to activating an Instant Capacity component, a Right to Use (RTU) codeword must be applied to the complex, to increase the component-specific usage rights on the complex. After a fee has been paid to HP for the type and number of components that are to be activated, RTU codewords are made available through the HP Utility Pricing Solutions portal (<http://www.hp.com/go/icap/portal>).

iCAP codewords (such as RTU codewords) are applied to the complex using the `icapmodify` command on any partition of the complex. iCAP codewords are generated with a sequence number and all iCAP codewords for a particular complex must be applied in the order in which they were generated.

After the appropriate codewords have been applied to a complex, additional components in the complex may be activated, up to the number of component usage rights granted by the applied codewords. Depending on their type, components are activated using the `icapmodify` command (if activating cores), or other commands including `parmmodify` (see *parmmodify (1M)*) and `parmgr` (see *parmgr (1M)*).

In addition to RTU codewords, cores can be activated with temporary capacity. Temporary capacity codewords allow the activation of more cores than allowed by the usage rights on the complex, but only for a limited time.

If a server is a member of a GiCAP group, usage rights from other members of the group may also be “borrowed” to activate additional components when needed. Additionally, temporary capacity on other members of a GiCAP group may be used to activate more cores than allowed by the core usage rights in the group.

Software Removal

Instant Capacity software cannot be removed. Other software products depend on it to approve configuration changes to the system.

Status Of Instant Capacity Components

Information about the Instant Capacity components on a complex and the available usage rights for each type of component can be obtained by invoking the `icapstatus` command. This command also provides information about the amount of temporary capacity presently in use and the projected expiration of the temporary capacity. If the complex is a member of a GiCAP group the command provides information about group membership, including any borrow or loan status of usage rights.

Detailed information about GiCAP groups can be obtained by invoking the `icapmanage -s` command on a Group Manager system.

Virtual Partitions

Instant Capacity may be present on systems or partitions where virtual partition technology is employed. In a virtual partition environment, cores that are not assigned to any virtual partition are considered inactive (in addition to other classes of inactive cores). Unassigned cores can be assigned (activated) or deassigned (deactivated) using either the `icapmodify` command or the `vparmmodify` command, depending on the type of adjustment needed, the version of vPars being used, and the level of logging or reporting desired.

One important consideration is that `vparmmodify` can be used to activate or deactivate cores in other virtual partitions within the `nPartition`; `icapmodify` only activates or deactivates cores within the current virtual partition (the partition where the command is invoked).

Another consideration is that core assignment via the `vparmmodify` command does not result in logging of the activation, e-mail configuration change notification, or transmission of an asset report to HP.

For versions of vPars before A.04, HP recommends using the `icapmodify` command when activating or deactivating cores in a virtual partition. This is the best way to ensure that the complex remains in a compliant state.

For vPars versions A.04 or greater, the `icapmodify` command must be used in a virtual partition environment when you are making any adjustment to an `nPartition`. If you are adjusting core assignments across virtual partitions in a single `nPartition`, you should use the `vparmmodify` command for the best coordination between the Instant Capacity software and the vPars software, and for optimized performance. The `vparmmodify` command is the fastest and most efficient way to adjust capacity within virtual partitions of a single hard partition, but it does not affect the intended active count for the `nPartition` and it therefore cannot be used to migrate unused capacity either to or from other `nPartitions`.

Note that with vPars version A.04 or greater, a compliance check is performed whenever a virtual partition is booted. If the total number of cores assigned to all virtual partitions in the current vPar database exceeds the `nPartition`'s intended active core count, the Instant Capacity software notifies the vPar monitor, and the monitor prevents

any virtual partition from booting until the user performs a hard partition boot and modifies either the vPar configuration or the Instant Capacity intended active count for the nPartition.

See *vparmodify* (1M) for more information on virtual partitions.

HP Integrity Virtual Machines (HPVM)

In an HPVM environment, Instant Capacity software provides meaningful functionality only on the VM Host; it does not run on a virtual machine (also known as a “guest”). In particular, Instant Capacity commands will report an error if attempted from a guest. A GiCAP Group Manager cannot be run on a guest.

Processor Sets

In an environment where processor sets are being used, the *icapmodify* command activates Instant Capacity cores into the default processor set and deactivates cores from only the default processor set. Activation or deactivation of cores in non-default processor sets is a two step operation, where the first step involves the user migrating the cores into or out of the default processor set, and the second step is the activation or deactivation of those cores using the *icapmodify* command.

See *psrset* (1M) for more information on processor sets.

Temporary Capacity (TiCAP) Program

Customers may purchase an amount of temporary capacity time. This temporary capacity can be used to activate one or more core(s) beyond the number for which usage rights have been purchased. These extra cores may remain active until they consume the available temporary capacity time. This allows temporary activation of cores without requiring the purchase and activation of an RTU codeword for permanent activation.

Note that whenever an Instant Capacity component without usage rights is purchased, an amount of Instant Access Capacity (IAC) may also be included. Instant Access Capacity is exactly the same as temporary capacity, except it is automatically provided with an Instant Capacity component and is not separately purchaseable. It provides an immediate buffer of temporary capacity in case extra capacity is needed before there is time to purchase either an RTU codeword, a temporary capacity codeword, or to setup a Global Instant Capacity (GiCAP) group.

Temporary capacity can be added to the complex by applying a temporary capacity codeword (available from the HP Utility Pricing Solutions portal) using the `icapmodify` command. Information about the amount of temporary capacity time remaining on a complex can be obtained by executing the `icapstatus` command. A warning is also sent via e-mail when the temporary capacity balance is expected to be depleted within a certain period of time.

The `icapmodify` command allows activating a core using temporary capacity only if at least 30 minutes of temporary capacity is available.

If temporary capacity is depleted and you continue to have more active cores than the number of core usage rights across the complex, on the next reboot of any partition in the complex, the software will automatically deactivate one or more cores in order to reconcile the number of active cores with the number of core usage rights available to the complex. Instant Capacity software will deactivate as many cores as is necessary to either stop consumption of temporary capacity or to bring the partition to the minimum number of active cores.

Instant Capacity Cell Board

Instant Capacity Cell Board offers a way to have additional (inactive) cell board capacity for your system. These Instant Capacity cell boards, which contain memory and cores, can be activated after a cell RTU codeword is obtained from the HP Utility Pricing Solutions portal and is applied to the complex using the `icapmodify` command. You must have usage rights for all memory attached to the cell and at least one core in order to activate a cell.

Global Instant Capacity (GiCAP)

Global Instant Capacity (GiCAP) provides HP customers with the flexibility to move usage rights (RTUs or “Rights to Use”) for Instant Capacity components within a group of servers. It also provides “pooled” temporary capacity across the group. This has several potential benefits: cost-effective high availability, more adaptable load balancing, and more efficient and easier use of temporary capacity.

For example, in case of planned or unplanned downtime, a customer can transfer usage rights (RTUs) from a failed partition on one server to one or more other server(s) in the group that are providing backup availability, thus allowing additional activations of iCAP components on

the backup server(s). Without GiCAP, the only way to provide this failover scenario is to provision each server with an adequate amount of temporary capacity in case of potential failures.

A similar scenario exists for load balancing. Rather than using temporary capacity whenever a server is overloaded (peak profiles for all workloads on a server), usage rights (RTUs) can be transferred from other servers in the GiCAP group that have extra capacity. These borrowed usage rights enable new component activations on the overloaded system.

Pooled temporary capacity for a group of servers is more efficient because all temporary capacity is available to all servers in the GiCAP group. It is also easier to manage if it is determined that temporary capacity only needs to be applied to one member of the group and monitored across the group instead of monitoring TiCAP for each member complex.

GiCAP Groups

Global Instant Capacity is built on the concept of a server group, or GiCAP group. The group consists of a list of server complexes that are allowed to share Instant Capacity usage rights (for cores, cell boards, and memory) and temporary capacity. There are no particular constraints on the number of servers allowed to be in a group, but there are grouping rules defined by HP to specify the types of servers allowed to group together.

GiCAP Group Manager

For each group, an HP-UX system must be designated as the Global Instant Capacity Group Manager. It is this system which maintains information about the group, group resources, and the grouping rules. `icapmanage` commands are intended to be invoked only on a Group Manager system to manage one or more GiCAP groups.

The Group Manager must be an HP-UX system running the Instant Capacity software. It does not need to have any Instant Capacity components, nor does it need to be a partitionable system. The system must have a machine-readable serial number, as displayed by the command `getconf CS_MACHINE_SERIAL`. It is recommended that the Group Manager not be on a partition that is a member of any GiCAP group. If run on a partitionable system, changing the configuration of the partitions may result in the GiCAP Manager becoming inoperative.

GiCAP Grouping Rules

Default grouping rules are provided with the Instant Capacity software. Under some circumstances you may need to acquire newer grouping rules from the portal (for example, adding new hardware not previously covered by the grouping rules). You install the encrypted rules file on the Group Manager system using the `icapmanage -i` command.

GiCAP Sharing Rights

In order to create a GiCAP group with members, you must purchase GiCAP Sharing Rights, acquire the GiCAP codeword from the HP Utility Pricing Solutions portal (<http://www.hp.com/go/icap/portal>), and apply the associated codeword to the Group Manager system. You purchase at least as many GiCAP Sharing Rights as the total number of cores without usage rights across all the potential group members. Members can be added to a GiCAP group as long as there are sufficient Sharing Rights available, and as long as the grouping rules indicate hardware compatibility.

Note that unlike other iCAP codewords, GiCAP codewords must be generated for, and applied to, a specific partition if the Group Manager is on a partitionable system. This means that in order to retrieve the codeword, you must specify the purchase order number, the system serial number and partition information, if any. Use the `icapmanage -s` command on the Group Manager system to get the serial number and and nPar ID, or vPar code that is applicable.

GiCAP codewords have a sequence value and must be applied in the order in which they were generated for the Group Manager system. However, GiCAP codewords are sequenced independently from any other types of iCAP codewords that might be generated for the same system, and can therefore be applied independently from iCAP codewords.

GiCAP Group Creation

After the Sharing Rights codeword and the grouping rules have been applied to the Group Manager (as needed), a GiCAP group can be created by issuing the `icapmanage` command using the `-a` and `-g` options. Members are added by issuing the `icapmanage` command using the `-a` option, the `-g` option to select the group name, and the `-m` option to

specify a name for the new member along with a list of hosts running on the system. The list of hosts must include at least one host per nPartition on the system.

Note that a single partition of a complex cannot join a GiCAP group; all partitions of a complex must be specified when creating a group member. Each member that joins the group decreases the available GiCAP Sharing Rights by the number of cores without usage rights contributed by that member complex.

GiCAP Resource Sharing

Once a group has been established, Instant Capacity resources (core, cell board, memory usage rights, and temporary capacity) may be shared among all the members of the group.

Usage rights are shared by deactivating resources on one group member, and then activating resources on another member of the group. In effect, the system on which the resources were deactivated is loaning usage rights to the activating (or borrowing) system. The activation and deactivation commands are done using the usual `icapmodify` commands on the individual member systems to effect this “loan” operation (also sometimes referred to as a transfer of usage rights).

Any temporary capacity available to individual members of the group is combined into a larger pool of temporary capacity that is available for consumption by any and all members of the group, as needed. Usage of shared temporary capacity is exactly the same as with individually purchased TiCAP: group members use the `icapmodify -a -t` command to activate shared temporary capacity. Note that this differs from the sharing of usage rights in that temporary capacity is never a “loan” to be returned; it is always depleted through its usage over time.

GiCAP Member Removal

Before removing a member from a GiCAP group, all the borrowed usage rights must be returned and all outstanding loans reclaimed by deactivating resources on the appropriate system. There is no need to activate resources to reclaim loaned usage rights as the act of removing the member from a GiCAP group will reclaim the necessary usage rights.

There is no constraint with respect to temporary capacity as it is consumed shortly after it moves from one member in a GiCAP group to another that requires it; it is never “returned”.

When a member is removed from a group, some number of Sharing Rights are released and become available for future use. The number freed is equal to the number used when the member was added to the group: equal to the number of cores without usage rights contributed by that member.

Upgrades and GiCAP

Care must be exercised before upgrading or changing hardware for any member of a GiCAP group. If a member of a GiCAP group changes hardware in such a way that the hardware is no longer compatible with the group, then the group is considered to be out of compliance and group functions are restricted as described in the section "Compliance".

Also, note that the number of available Sharing Rights is adjusted whenever an iCAP codeword is applied to a GiCAP member system which modifies the number of cores without usage rights on that member. (RTU and AddOn codewords for cores cause such adjustments.)

If available Sharing Rights go negative (more in use than were purchased for the Group Manager), then all groups managed by that Group Manager are out of compliance and all group functions are restricted until the problem is resolved. The problem can be resolved by purchasing and applying additional Sharing Rights to the Group Manager, purchasing and applying core usage rights (RTUs) to one or more group members, or by removing one or more group members from their group.

Multiple Group Considerations

You can create multiple GiCAP groups and they can be managed by the same Group Manager or by different Group Manager systems.

A server complex can only be a member of a single GiCAP group at a time. In order to participate in a different group, it must be removed from one group before being added to the other group.

Sharing Rights can never be transferred between two Group Manager systems. As you create new groups and/or add new members to existing groups, you may need to purchase and apply additional Sharing Rights to the relevant Group Manager systems.

Additional GiCAP Considerations

Systems which do not have any Instant Capacity components can be part of a GiCAP group. Deactivating resources on these systems allows them to loan usage rights to other members in the group.

Members of a GiCAP group do not have to be located near each other. IP connectivity between the members and the Group Manager, sufficient GiCAP Sharing Rights, and adherence to the GiCAP grouping rules are the only constraints.

The GiCAP software uses the HP-UX Secure Shell product to provide secure communication between the Group Manager and the group members. If SSH is installed after Instant Capacity, a provided script (`/etc/opt/iCAP/GiCAP_keygen`) must be invoked in order to configure secure communication.

It is recommended that the IP address of the Group Manager not be a dynamic address. The member systems of a GiCAP group store the IP address of the Group Manager and therefore will lose communication with the Group Manager if the IP address changes.

If the GiCAP Group Manager system becomes unavailable, usage rights and temporary capacity remain as per allocated to each group member. Within a server complex, the usage rights can be deployed to other partitions, but movement of usage rights between complexes is unavailable when the Group Manager is unavailable.

Compliance

In general, a complex is in a compliant state when the number of active components of a given type does not exceed the number of usage rights associated with the type of component. The one exception is that the number of active cores is allowed to exceed the number of core usage rights as long as there is a sufficient positive balance of temporary capacity.

A GiCAP group is in a compliant state as long as all the members are in a compliant state, all the members of the group continue to have compatible hardware as determined by the hardware grouping rules, and as long as the number of Sharing Rights installed on the GiCAP manager is equal or greater than the total number of cores without usage rights on complexes managed by the Group Manager.

SEE ALSO

icapmodify (1M), *icapnotify* (1M), *icapstatus* (1M), *icapmanage* (1M),
icapd (1M).

icapmanage (1M) Manpage

icapmanage (1M)

NAME

icapmanage – Global Instant Capacity (GiCAP) management commands for GiCAP groups.

SYNOPSIS

```
icapmanage -i -U <rule_file>
icapmanage -C <codeword>
icapmanage -a -g <group_name>
icapmanage -r -g <group_name>
icapmanage -T <host>[,<host>]... [-g <group_name>]
icapmanage -a -m <member_name>:<host>[,<host>]... -g
<group_name>
icapmanage -r -m <member_name>
icapmanage -s -g <group_name> [-b] [-v]
icapmanage -R [<host>[,<host>]...] [-U <rule_file>]
icapmanage -x <host>
```

DESCRIPTION

A Global Instant Capacity (GiCAP) group consists of a list of server complexes that are allowed to share Instant Capacity usage rights (for cores, cell boards, and memory) and temporary capacity. For each group, an HP-UX system must be designated as the Global Instant Capacity Group Manager.

icapmanage commands are intended to be invoked only on a Group Manager system in order to create, manage, and remove the group. The command can be used to install a grouping rules file, apply a GiCAP Sharing Rights codeword, create and remove GiCAP groups, test if a

server can be added to a GiCAP group, show grouping rules and supported hardware, and extract usage rights from one member of a GiCAP group to be used by another member of the group.

For a complete overview of Global Instant Capacity, see *icap* (5) and for more detailed information see the Instant Capacity User's Guide located at /usr/share/doc/icapUserGuide.pdf.

Options

`icapmanage` recognizes these options and arguments:

- `-a` Add a GiCAP group or add a member to a group. To create a new group, use the `-a` option with the `-g` option to name the new group. To add a member to a GiCAP group, use the `-a` option, along with the `-m` option to specify a member name and list of hostnames, and the `-g` option to specify the group name.
- `-b` Provide brief status information. Show group-level information without member-level information.
- `-g <group_name>` Specify a GiCAP group name for a GiCAP operation.
- `-i` Install a grouping rules file on a Group Manager system.
- `-m <member_name>:<host>[,<host>]...` When adding a server to a group, specify a `member_name` for the server complex and specify a representative host for each nPartition of that server. All nPartitions must be represented in the host list. A host can be specified using either the IP address or the name of the host. A server can be added if it is not in an exception state, if there are enough GiCAP Sharing Rights available to match the number of cores without usage rights on that server, and if the grouping rules indicate compatible hardware. Note: when you first add a member to a group, you will be prompted for the root password for each specified host. The password is used only for initial communication and is not saved or stored.

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icapmanage (1M) Manpage

-m <member_name>	Specify the member name when removing a member from a GiCAP group.
-r <member_name>	Remove a member from a group or remove a GiCAP group. When used in combination with the -m option to specify the member name, removes that member from a GiCAP group. Note that a member cannot be removed from a group until any “borrowed” usage rights have been returned to the group and any “loaned” usage rights have been returned to the member. Removal of a member from a group releases Sharing Rights and makes them available for future use. When used in combination with the -g option, removes the specified GiCAP group. All members must be removed before the group can be removed.
-s	Request status about one or more GiCAP groups. Specification without any additional options displays group and member information for all GiCAP groups managed by this Group Manager. Use the -g <group_name> option to limit the information to the named group only. Use -b to display group-level information only, without member-level information. Use -v to include information describing allocation of resources among the hard partitions. For more information about fields that are displayed see “Status Information”.
-v	Provide verbose status information. Include group-level and member-level information, and information describing the allocation of resources among the hard partitions.
-x <host>	Extract available core usage rights from the specified host to make them available to other group members. The host must be a system which is not currently running (the system is down), but must be part of a server complex that contains at least one partition that is up and accessible to the Group Manager software. The hard partition containing the host will have the value Intended Active set to the required minimum (one core per configured cell).

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-C <codeword>

GiCAP Codeword Application. This option allows the user to apply a GiCAP Sharing Rights codeword to a Group Manager system. (This option cannot be used to apply an iCAP codeword such as an RTU or TiCAP codeword.) First, the GiCAP codeword must be purchased from HP. The number of rights purchased should equal or exceed the number of cores without usage rights for all planned member(s) for all groups managed by the Group Manager. Next, the codeword should be retrieved from the HP Utility Pricing Solutions portal and applied to the Group Manager system. Unlike iCAP codewords, GiCAP codewords are generated for a specified partition on a Group Manager system, and can only be applied to that partition. Like iCAP codewords, GiCAP codewords are also generated in a sequence and must be applied in the order they are generated for the Group Manager partition. However, GiCAP codewords are sequenced independently from any iCAP codewords for the same complex, and can be applied independently from any such iCAP codewords. Application of the GiCAP codeword allows member(s) to be added to one or more GiCAP groups.

-R [<host>[, <host>]...]

Report hardware grouping information. When used in combination with a list of host names, reports all hardware types with which the host(s) might be grouped. The host(s) can be specified using either the IP address or the name of the host. If the hosts are not compatible with each other, no hardware will be reported. Without a list of host names, reports all supported hardware and grouping rules. Specification of the -U option reports hardware associated with the specified rule file instead of the installed rule file.

-T [<host>[, <host>]...]

Test hardware compatibility for one or more host systems in order to determine which group(s) the systems can join. When used in combination with the -g option to specify a group name, tests whether the specified host system(s) have hardware which is compatible with the group. Without the -g option,

report which groups of all the groups managed by this Group Manager have hardware which is compatible with the host system(s). A host can be specified using either the IP address or the name of the host. The host names do not have to be from the same complex, but in order to best predict the possibility of being able to join a group, the list of hosts should include all the nPartitions for a particular complex. If the hosts are not compatible with each other, no groups will be reported as having compatible hardware.

-U <rule_file>

Specify the filename of a rule file.

Status Information

This section describes the fields that might be displayed when `icapmanage -s` is invoked to show status. The exact choice of options used in combination with the `-s` option determines how much of the information is displayed.

To begin, the display shows the software version number of the Global Instant Capacity software and the identification information for the Group Manager: serial number, nPar ID (if any), and vPar code (if any). This identification information is necessary when requesting a Sharing Rights codeword from the portal.

Next it displays the number of Sharing Rights which have been purchased for this Group Manager, and how many Sharing Rights are currently in use versus the number still available to accommodate addition of new members or new groups with new members.

Information displayed for each GiCAP group

These values can be displayed for each group managed by the Group Manager.

Group ID:

This field displays the name of the GiCAP group.

Group Members:

This summarizes the name of each member in the group, and also shows the host names comprising each member complex.

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Instant Capacity Resource Summary for the group

This section shows values which are summed across all group members.

Number of cells without usage rights:

This field displays the total number of cells across all group members which must remain inactive because usage rights have not been purchased.

Number of inactive cells

This field displays the actual number of inactive cells across the group.

Amount of memory without usage rights:

This field displays the total amount of memory across all group members which must remain inactive because usage rights have not been purchased.

Amount of inactive memory:

This field displays the actual amount of inactive memory across the group.

Number of cores without usage rights:

This field displays the total number of cores across all group members which must remain inactive because usage rights have not been purchased.

Number of inactive cores:

This field displays the actual number of inactive cores across the group.

Number of cores using temporary capacity:

This field displays the number of cores using temporary capacity anywhere within the group.

Temporary Capacity available:

This field displays the total amount of temporary capacity pooled for the entire group and available to any member of the group.

Projected temporary capacity expiration:

This field displays the date and time that temporary capacity is projected to expire for the group at the present consumption rate.

Information Displayed for each Member of the Group

This section is repeated for each member of the group. It potentially consists of two parts: the “Instant Capacity resource summary for the member” (similar to the values described above for the group, but with values summed across the member complex, not the group), and the “Allocation of Instant Capacity resources among the nPartitions for the member”. Each of these sections is identical to the similarly titled display seen if `icapstatus` is invoked on the member complex. For convenience, this information is provided on the Group Manager system in order to see the values for all group members with one command. This section (member information) is not shown at all if the `-b` option is used. The “Allocation of Instant Capacity resources among the nPartitions for the member” section is not shown unless the `-v` option is used.

EXTERNAL INFLUENCES

Environment Variables

- `LANG` determines the locale to use for the locale categories when both `LC_ALL` and the corresponding environment variable (beginning with `LC_`) do not specify a locale. If `LANG` is not set or is set to the empty string, a default of “C” is used (see `lang (5)`).
- `LC_CTYPE` determines the interpretation of single- and multi-byte characters.
- `LC_MESSAGES` determines the language in which messages are displayed.

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If any internationalization variable contains an invalid setting, **icapmanage** behaves as if all internationalization variables are set to "C" (see *environ* (5)).

International Code Set Support

Single- and multi-byte character code sets are supported.

RETURN VALUE

icapmanage exits with one of these values:

0	Command succeeded.
>0	Command failed; error message sent to STDERR .

FILES

/var/adm/GiCAP.log	Log file for GiCAP operations and messages.
/etc/opt/iCAP/GiCAP.rules	Encrypted file containing grouping rules used by the Group Manager.
/etc/opt/iCAP/GiCAP.database	Encrypted file containing information about Sharing Rights and information about each group managed by the Group Manager.
/etc/opt/iCAP/GiCAP_keygen	Script file to configure secure communication between the Group Manager and member(s) of a group. Needed only if the HP-UX Secure Shell product is installed after installation of Instant Capacity.
/etc/opt/iCAP/.GiCAPKey	Key files used by SSH for secure communication between the Group Manager and member(s) of a group.
/etc/opt/iCAP/.GiCAPKey.pub	

Instant Capacity HP-UX Manpages
icapmanage (1M) Manpage

EXAMPLES

Install a new grouping rules file.

```
icapmanage -i -U /tmp/GiCAP.rules
```

Purchase a Sharing Rights codeword from HP with rights equal to or greater than the number of cores without usage rights for all planned members of the group. Retrieve the codeword from the portal, and apply the Sharing Rights codeword to the Group Manager system.

```
icapmanage -C \
R8J2DBW.5UTxyWQ.2MekJ43.G5cdTVP.1-m9kvweQ.AYqEXym.wj3dyLj.
Fbtg7s1
```

Create a GiCAP group named ADMIN1.

```
icapmanage -a -g ADMIN1
```

Test if a server complex has hardware which is compatible with the group.

```
icapmanage -T mypar1.node.hp.com,mypar2.node.hp.com -g
ADMIN1
```

Add a member called IT to the ADMIN1 group. Supply the root password for each of these partitions in response to the prompts.

```
icapmanage -a -m IT:mypar1.node.hp.com,mypar2.node.hp.com
-g ADMIN1
```

```
root@mypar1.node.hp.com's password:
```

```
root@mypar2.node.hp.com's password:
```

Show the full status of the ADMIN1 group.

```
icapmanage -s -g ADMIN1 -v
```

Extract core usage rights from a partition that is down, so that they will be available for other group member activations.

```
icapmanage -x mypar1.node.hp.com
```

Report supported hardware and grouping rules for a specific grouping rules file.

```
icapmanage -R -U /tmp/GiCAP.rules
```

Remove group member IT from its group.

```
icapmanage -r -m IT
```

Instant Capacity HP-UX Manpages
icapmanage (1M) Manpage

Remove the ADMIN1 group.

```
icapmanage -r -g ADMIN1
```

AUTHOR

icapmanage was developed by HP.

SEE ALSO

icapmodify (1M), *icapstatus* (1M), *icapd* (1M), *icap* (5).

icapmodify (1M) Manpage

icapmodify (1M)

NAME

icapmodify – Activate and deactivate cores. Specify system contact e-mail address. Change Instant Capacity (iCAP) configuration information. Specify Instant Capacity from e-mail address. Specify system identifier. Specify temporary capacity warning period. Apply codewords.

SYNOPSIS

```
icapmodify -c <contact_e-mail_address>
icapmodify -C <codeword>
icapmodify -f <from_e-mail_address>
icapmodify -i <system_id>
icapmodify -r
icapmodify -w <warning_days>
icapmodify -a <n> [-D] [-t] [desc[:user_name]]
icapmodify -d <n> [-D] [desc[:user_name]]
icapmodify -s <n> [-D] [-t] [desc[:user_name]]
```

Obsolescent:

```
icod_modify -c <contact_e-mail_address>
icod_modify -C <codeword>
icod_modify -f <from_e-mail_address>
icod_modify -i <system_id>
icod_modify -r
icod_modify -w <warning_days>
icod_modify -a <n> [-D] [-t] [desc[:user_name]]
icod_modify -d <n> [-D] [desc[:user_name]]
```

```
icod_modify -s <n> [-D] [-t] [desc[:user_name]]
```

DESCRIPTION

Use **icapmodify** to activate or deactivate cores, specify system contact or Instant Capacity “from” e-mail address, apply iCAP codewords, change the system identifier, specify a warning notification period before temporary capacity expires, and change Instant Capacity configuration information.

Note that the deprecated **icod_modify** command performs identical functions to the **icapmodify** command and is maintained for backward compatibility.

For detailed information on the use of this command, activation and deactivation of Instant Capacity components, compliance, and temporary capacity, see the Instant Capacity User's Guide located at `/usr/share/doc/icapUserGuide.pdf`.

Compliance

icapmodify does not allow activation of cores beyond the number of available core usage rights. Additional usage rights are granted through the application of either an RTU codeword or a temporary capacity codeword. In general, a complex is in a compliant state when the number of active components of a given type does not exceed the number of usage rights associated with the type of component. The one exception is that the number of active cores is allowed to exceed the number of core usage rights as long as there is a sufficient positive balance of temporary capacity.

Intended Active

Changes to the number of intended active cores through the use of this command are persistent (survive system reboot). The intended active number is the number of cores that the Instant Capacity software attempts to activate at system boot time. It is adjusted by use of the **-a**, **-d** and **-s** options. The number of intended active cores for each partition is displayed using the **icapstatus** command (see **icapstatus (1M)**).

Virtual Partitions

When activating or deactivating cores within virtual partitions, special considerations apply. You can use either the `icapmodify` command or the `vparmmodify` command, depending on the version of vPars being used, the type of adjustment needed, and the level of logging or reporting desired. For example, core assignment via the `vparmmodify` command does not result in logging of the activation, e-mail configuration change notification, or transmission of an asset report to HP.

For versions of vPars before A.04, HP recommends using the `icapmodify` command when activating or deactivating cores in a virtual partition. This is the best way to ensure that the complex remains in a compliant state.

For vPars versions A.04 or greater, the `icapmodify` command must be used in a virtual partition environment when you are making any adjustment to an nPartition. If you are adjusting core assignments across virtual partitions in a single nPartition, you should use the `vparmmodify` command (-a and -d options) for the best coordination and for optimized performance. The `vparmmodify` command does not affect the intended active number for the nPartition, and it therefore cannot be used to migrate unused capacity either to or from other nPartitions.

Options and Arguments

`icapmodify` recognizes the following options and arguments:

- a <n>** Immediately activates *n* additional cores for this nPartition, as long as the end result does not take the complex out of compliance. This option also increases the number of intended active cores by *n* for the nPartition. If specified within a virtual partition, it also results in the assignment of additional cores to the local vPar.
- c <contact_email_address>** Sets the system contact e-mail address. This is the e-mail address that will receive configuration change notification and exception reports. Note that this can be an e-mail alias, if multiple recipients of these reports are desired.

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-C <codeword>	iCAP codeword application. This option allows the user to apply an iCAP codeword received from the HP Utility Pricing Solutions portal. Application of codewords only provides usage rights for Instant Capacity components; it does not activate any components. This option cannot be used to apply GiCAP codewords. See <i>icapmanage</i> (1M) for details about GiCAP codewords.
-d <n>	Immediately deactivates <i>n</i> cores if possible. Instant Capacity software must leave at least one core active for each configured cell in a partition — this is a firmware and OS requirement. That is, in a partition of 4 cells, attempts to reduce the active core count below 4 will fail. This option also reduces the number of intended active cores by <i>n</i> for the nPartition. And if specified within a virtual partition, it deassigns the specified number of cores from the local vPar.
-D	Defers a core activation or deactivation until the next reboot. This option modifies the default behavior of the -d, -s, and -a options, which is to activate or deactivate cores instantly. This option is not supported within a virtual partition. NOTE: deferred operations are not cumulative. If there is a pending deferred operation, a subsequent activation or deactivation request (-s, -a, or -d), deferred or not, cancels the pending deferred request and resets the values for intended active and actual active based on the request and the current value for actual active.
-f <from_email_address>	Set Instant Capacity “from” e-mail address. Causes all Instant Capacity e-mail correspondence from this system to appear to be sent from <i>from_email_address</i> . Specifying an empty string ("") returns to default behavior, which is to send from the adm user on the local system. The address specified must be DNS resolvable by HP.
-i <system_id>	Set system identifier used during asset reporting. The default setting for the system identifier is the

hostname of the Instant Capacity system. This value can be returned to the default setting by specifying an empty string (""). The system identifier is a string that users specify to help track and distinguish their systems.

- r** Reconcile. Activate or deactivate cores (subject to compliance limits) to bring the system to a state where the intended active number of cores are active.
- w <warning days>** Set temporary capacity warning period to desired number of days. If not specified, the default warning period is 15 days. The Instant Capacity software calculates when the temporary capacity will expire based on the current consumption rate. When the temporary capacity balance is projected to be depleted within the warning period, a warning message is sent by e-mail to the system-contact if specified, and root. Note that if temporary capacity is depleted and you continue to have more active cores than core usage rights across the complex, on the next reboot of any partition in the complex the software will automatically deactivate one or more cores in order to bring the complex into a more compliant state. Instant Capacity software will deactivate as many cores as is necessary to either stop consumption of temporary capacity or to bring the partition to the minimum number of required active cores.
- s <n>** Sets the number of active cores and the number of intended active cores to *n*, as long as the end result does not take the complex out of compliance. Depending on the value of *n*, this option works exactly as the **-a** option (if *n* is greater than the current number of active cores), or exactly as the **-d** option (if *n* is less than the current number of active cores). Specifying a value of *n* less than the number of cells in a partition will fail.
- t** Authorize use of temporary capacity. This option, in combination with either the **-a** or the **-s** option, specifies that a core activation is allowed to consume temporary capacity. Temporary capacity is

consumed when the number of active cores exceeds the number of core usage rights. It is no longer used when the number of active cores is decreased to no more than the number of core usage rights available to the complex. Use `icapmodify -d` or `-s` to reduce or stop the use of temporary capacity. It is not necessary to use the `-t` option when using the `-d` option. If a previous activation via `icapmodify` has resulted in temporary capacity being consumed in a virtual partition environment, deactivating a core with a `vparmmodify` command temporarily reduces the consumption of temporary capacity. A subsequent core activation using `vparmmodify` increases consumption of temporary capacity if the activation results in more active cores than core usage rights.

<i>desc</i>	Optional description to help customers identify this configuration change. This description becomes part of the Instant Capacity logfile (<code>var/adm/icap.log</code>) entry documenting the activation or deactivation. This description is also contained in the configuration change notification e-mail.
<i>user_name</i>	Optional string identifying the person performing the core activation or deactivation. This can be any ASCII string, and will become part of the Instant Capacity logfile (<code>/var/adm/icap.log</code>) entry documenting the activation or deactivation. The string specified here will also be contained in the configuration change notification e-mail.

UPGRADES

The `icapmodify` command fails if the system is in a state where a software upgrade is incomplete (the software on the system has been upgraded from a version earlier than B.06.00, but an upgrade codeword issued by the HP Utility Pricing Solutions portal (<http://www.hp.com/go/icap/portal>) has not been applied to the complex). The only option that can be used when the complex is in this state is the `-C` option, which accepts the upgrade codeword.

EXTERNAL INFLUENCES

Environment Variables

- `LANG` determines the locale to use for the locale categories when both `LC_ALL` and the corresponding environment variable (beginning with `LC_`) do not specify a locale. If `LANG` is not set or is set to the empty string, a default of “C” is used (see *lang* (5)).
- `LC_CTYPE` determines the interpretation of single- and multi-byte characters.
- `LC_TIME` determines the date and time strings output.
- `LC_MESSAGES` determines the language in which messages are displayed.
If any internationalization variable contains an invalid setting, `icapmodify` behaves as if all internationalization variables are set to “C” (see *environ* (5)).

International Code Set Support

Single- and multi-byte character code sets are supported. However, input to the command must be entered using ASCII characters only.

RETURN VALUE

`icapmodify` exits with one of these values:

0	Command succeeded.
>0	Command failed; error message sent to <code>STDERR</code> .

FILES

`/var/adm/icap.log`

EXAMPLES

Instantly activate one core with "Add horsepower now" as the description and "Super User" as the user name:

```
icapmodify -a 1 "Add horsepower now:Super User"
```

Activate two cores (deferred until the next reboot) with "Add horsepower after reboot" as the description and "Super User" as the user name:

```
icapmodify -D -a 2 "Add horsepower after reboot:Super User"
```

Instantly activate one core, using temporary capacity if necessary, with "Temp use of one core" as the description and "Super User" as the user name:

```
icapmodify -t -a 1 "Temp use of one core:Super User"
```

Instantly activate or deactivate cores to specify 8 active cores (and 8 intended active cores) with "Set active cores to 8" as the description and "Super User" as the user name.

```
icapmodify -s 8 "Set active cores to 8:Super User"
```

Deactivate one core at the next reboot with "Less horsepower after reboot" as the description and "Super User" as the user name:

```
icapmodify -D -d 1 "Less horsepower after reboot:Super User"
```

Apply an iCAP codeword:

```
icapmodify -C \
7y5ejVS.P5CuwXu.XaTyDVP.7Tx0Mvc-J783H9b.yWT5Weu.69JPu$u.vVV685a5
```

Set the Instant Capacity from_email_address to admin@research.corp.com:

```
icapmodify -f admin@research.corp.com
```

Set the system_id to Asset_Num_234:

```
icapmodify -i Asset_Num_234
```

Set the system contact e-mail address to super_user@corp.com:

```
icapmodify -c super_user@corp.com
```

Instant Capacity HP-UX Manpages
icapmodify (1M) Manpage

AUTHOR

icapmodify was developed by HP.

SEE ALSO

icapnotify (1M), *icapstatus (1M)*, *icapmanage (1M)*, *icapd (1M)*, *icap (5)*.

icapnotify (1M) Manpage

icapnotify (1M)

NAME

icapnotify – Test e-mail connectivity to HP for Instant Capacity (iCAP) systems. Request a confirmation response e-mail from HP. Turn configuration change notification and asset reporting on or off.

SYNOPSIS

```
icapnotify <reply_address>
icapnotify -a on/off
icapnotify -n on/off
```

Obsolescent:

```
icod_notify <reply_address>
icod_notify -a on/off
icod_notify -n on/off
```

DESCRIPTION

When a *reply_address* is specified, **icapnotify** sends an asset report via e-mail to HP, root, and the specified e-mail address. Confirmation e-mail is sent from HP to the specified reply e-mail address indicating that HP received the asset report e-mail.

Note that asset reporting is optional but can be useful for viewing complex-wide asset information at the HP Utility Pricing Solutions portal (<http://www.hp.com/go/icap/portal>).

The deprecated command **icod_notify** provides identical functionality to the **icapnotify** command and is maintained for backward compatibility.

For detailed information on e-mail configuration and requirements, see the Instant Capacity User's Guide located at */usr/share/doc/icapUserGuide.pdf*.

Options

`icapnotify` recognizes these options and arguments:

<code>-a on/off</code>	Turns e-mail asset reporting <i>on</i> or <i>off</i> . This option is used to specify if the Instant Capacity software should send asset reports to HP via e-mail. The <code>icapstatus</code> command displays the present setting for this option.
<code>-n on/off</code>	Turns configuration change notification <i>on</i> or <i>off</i> . If specified <i>on</i> , executing the <code>icapmodify</code> command results in a configuration change notification e-mail sent to the system contact e-mail address summarizing any configuration change. Configuration change notification e-mail can be turned off by specifying <i>off</i> . Configuration change notifications are not sent if the system contact e-mail address is not set.

EXTERNAL INFLUENCES

Environment Variables

- `LANG` determines the locale to use for the locale categories when both `LC_ALL` and the corresponding environment variable (beginning with `LC_`) do not specify a locale. If `LANG` is not set or is set to the empty string, a default of “C” is used (see *lang* (5)).
- `LC_CTYPE` determines the interpretation of single- and multi-byte characters.
- `LC_MESSAGES` determines the language in which messages are displayed.

If any internationalization variable contains an invalid setting, `icapnotify` behaves as if all internationalization variables are set to “C” (see *environ* (5)).

International Code Set Support

Single- and multi-byte character code sets are supported.

RETURN VALUE

icapnotify exits with one of these values:

0	Command succeeded.
>0	Command failed; error message sent to STDERR.

EXAMPLES

Test e-mail connectivity with HP by sending an asset report to HP, root, and "super_user@corp.com", and request a confirmation e-mail from HP to be sent to "super_user@corp.com".

```
    icapnotify super_user@corp.com
```

Turn e-mail asset reporting on:

```
    icapnotify -a on
```

Turn e-mail asset reporting off:

```
    icapnotify -a off
```

Turn configuration change notification on:

```
    icapnotify -n on
```

Turn configuration change notification off:

```
    icapnotify -n off
```

AUTHOR

icapnotify was developed by HP.

SEE ALSO

icapmodify (1M), *icapstatus (1M)*, *icapmanage (1M)*, *icapd (1M)*, *icap (5)*.

icapstatus (1M) Manpage

icapstatus (1M)

NAME

`icapstatus` – Display Instant Capacity (iCAP) status and system information.

SYNOPSIS

```
icapstatus
icapstatus -s

Obsolescent:
icod_stat
icod_stat -s
```

DESCRIPTION

The `icapstatus` command displays Instant Capacity status and configuration information, counts, status, and allocation of Instant Capacity components (cores, memory, and cells) for an Instant Capacity system. If the system is a member of a Global Instant Capacity (GiCAP) group, membership information and status on any borrowed or loaned usage rights is displayed. Optionally, system snapshot information containing encrypted audit data is displayed. The deprecated `icod_stat` command performs the identical functions and is maintained for backward compatibility.

For further information see the Instant Capacity User's Guide located at `/usr/share/doc/icapUserGuide.pdf`.

If no options are specified `icapstatus` displays:

Software Version:

This field displays the version of the Instant Capacity client software on the local system.

System ID:

This field displays the user-specified system identifier that the Instant Capacity system uses when reporting the system state to HP, and when HP refers to this

system in correspondence to the system contact. The default value for this field is the hostname of the Instant Capacity system. To change this value, use the *icapmodify -i* command (see *icapmodify (1M)*).

Serial number: This field displays the Instant Capacity complex's hardware serial number.

Product number:

This field displays the Instant Capacity complex's hardware product number.

Unique ID: This field displays a unique identifier for the Instant Capacity complex (generated by HP).

System contact e-mail:

This field displays the e-mail address for the person who should receive configuration change notification and exception reports for the local system. This field is set via the *icapmodify -c* command.

From e-mail: This field displays the e-mail address that will be specified as the sender of all Instant Capacity initiated e-mail correspondence for the local system. This field is set via the *icapmodify -f* command. If not set, e-mail will be sent from the *adm* user on the local system.

Asset reporting: This field indicates if the Instant Capacity software on the local system is presently configured to send e-mail asset reports to HP. This is configured using the *icapnotify -a* command.

Temporary capacity warning period:

This field displays the number of days constituting the temporary capacity warning period for the complex. When the temporary capacity balance is projected to be depleted within this number of days, a warning message is sent by e-mail to the system contact and to root. The value of the warning period can be set using the *icapmodify -w* command.

Exception Status:

This field indicates if the complex is presently in an exception state. A complex is usually in an exception state when the number of active components of a given type (cores, cells, memory) exceeds the number of

available usage rights for that component type. The one exception is that the number of active cores is allowed to exceed the number of core usage rights as long as there is a sufficient positive balance of temporary capacity. A negative temporary capacity balance is always an exception state.

Information displayed for a GiCAP group

The following status is displayed when the system is a member of a Global Instant Capacity (GiCAP) group.

Member

<mname> of GiCAP group *<gname>*, managed by
<GroupManager>

This section heading identifies the member name and the name of the GiCAP group that includes this system as a member. It also identifies the name of the Group Manager system where you can get more detailed information about the group, by invoking the *icapmanage* command (see *icapmanage (1M)*).

Borrowed/Loaned core usage rights:

This field identifies the count of core usage rights which have either been borrowed from or loaned to the GiCAP group. This value must be 0 in order to remove the member from the GiCAP group.

Borrowed/Loaned cell usage rights:

This field identifies the count of cell board usage rights which have either been borrowed from or loaned to the GiCAP group. This value must be 0 in order to remove the member from the GiCAP group.

Borrowed/Loaned memory usage rights:

This field identifies the count of memory usage rights which have either been borrowed from or loaned to the GiCAP group. This value must be 0 in order to remove the member from the GiCAP group.

The output of *icapstatus* reflects the results of any GiCAP group operations: the borrowing or loaning of component usage rights or the transfer of temporary capacity. The output does not take into account any component usage rights or temporary capacity that may be available

on other GiCAP group members. Thus, `icapstatus` on group member A may report that there are no additional cores that may be activated with current usage rights even though there is an inactive core on group member A and an available core usage right on group member B. Use the `icapmanage` command on the Group Manager system to get more complete information about available group resources.

When a group member is using temporary capacity and core usage rights are made available on another group member through the use of `icapmodify -d <n>`, there may be a delay between the time the core usage rights are made available and the time the core usage rights move to the group member using temporary capacity. This also means that there may be a delay before the final result is reflected in the output of `icapstatus` for each group member involved in the transfer of the core usage rights.

Information displayed for the local virtual partition

The following status is displayed when `icapstatus` is run on a virtual partition. Note that some of the displayed information pertains specifically and only to the local virtual partition (such as the “number of active assigned cores” or “number of inactive assigned cores”). However, because usage rights and temporary capacity are always calculated globally across the entire complex, other local values involving these items (such as the “can be assigned” or “could be assigned” values) are the result of calculations using count values across all the partitions.

Total number of assigned cores:

This field displays the total number of cores assigned to the local virtual partition.

Number of active assigned cores:

This field displays the number of assigned cores in the local virtual partition that are currently active.

Number of inactive assigned cores:

This field displays the number of assigned cores in the local virtual partition that are currently inactive.

Additional cores that can be assigned with current usage rights:

This field displays the number of unassigned cores in the hard partition that are not currently assigned to any virtual partition and can be instantly assigned, because enough usage rights are available.

Number of cores that could be assigned with additional usage rights:

This field displays the number of cores that are available for assignment to the virtual partition if additional usage rights are purchased, or additional usage rights were borrowed from a GiCAP group.

Number of cores that can be assigned with temporary capacity:

This field displays the number of additional cores (beyond the number allowed by purchased usage rights or currently borrowed GiCAP usage rights) that can be assigned to the virtual partition and activated using temporary capacity currently available on the complex. When assigning and activating a core using temporary capacity, `icapmodify` assumes the core will be active for at least 30 minutes. Thus, if a complex has a small temporary capacity balance, it may not be possible to activate all the inactive cores in a partition using temporary capacity. Also note that temporary capacity will not be used as long as there are available core usage rights on the complex (or in the group, if a member of a GiCAP group), even if the `-t` option is used with `icapmodify` for an activation.

Number of cores that are deconfigured or attached to local cells:

This field displays the number of unassigned cores in the hard partition that are not assigned to the local virtual partition and cannot be instantly assigned. This number includes cores in inactive cells and deconfigured cores. When using versions of vPars before A.04, bound processors at the time the local virtual partition booted, if unbound later, cannot be instantly assigned to the local virtual partition without an intervening reboot (and assuming usage rights are available).

Information displayed for the local nPartition

The following status is displayed when `icapstatus` is run on a hard partition. Much of this information is also displayed when `icapstatus` is run on a virtual partition, except as otherwise specified. Note that some of the displayed information pertains specifically and only to the local

hard partition (such as the “number of active cores” or “number of inactive cores”). However, because usage rights and temporary capacity are always calculated globally across the entire complex, other local values involving these items (such as “can be activated” or “could be activated” values) are the result of calculations using count values across all the partitions.

Total number of configured cores:

This field displays the number of cores physically present in the hard partition.

Number of Intended Active cores:

This field displays the number of cores requested to be active for this hard partition; this is the number of cores that will be activated during a boot operation. Typically, this is the number that results from the execution of an **icapmodify** command. Other commands such as **parmodify** and **parcreate** can also affect this value. **vparmodify** does not affect this value.

Number of active cores:

This field displays the current number of cores active in the hard partition.

Number of inactive cores:

This field displays the current number of inactive cores in the hard partition.

Additional cores that can be activated with current usage rights:

This field displays the number of cores that are immediately available for activation using existing core usage rights on the complex. This information is not displayed on a virtual partition.

Number of cores that could be activated with additional usage rights:

This field displays the number of cores that are available for activation if additional core usage rights were purchased or additional usage rights were borrowed from a GiCAP group. These cores are also available for temporary activation if temporary capacity is available. This information is not displayed on a virtual partition.

Number of cores that can be activated with temporary capacity:

This field displays the number of additional cores (beyond the number allowed by the purchased usage rights or currently borrowed GiCAP usage rights) that can be activated using temporary capacity currently available on the complex. When activating a core using temporary capacity, `icapmodify` assumes the core will be active for at least 30 minutes. Thus, if a complex has a small temporary capacity balance, it may not be possible to activate all the inactive cores in a partition using temporary capacity. Also note that temporary capacity will not be used as long as there are available core usage rights on the complex, even if the `-t` option is used with `icapmodify` for an activation. This information is not displayed on a virtual partition.

Number of cores that are deconfigured or attached to inactive cells:

This field displays the number of cores that cannot be activated by Instant Capacity software. This includes cores in inactive cells, deconfigured cores, and failed cores deactivated due to LPMCs (Low Priority Machine Checks). This information is not displayed on a virtual partition.

Instant Capacity Resource Summary

The following status is displayed for the entire complex:

Number of cells without usage rights:

This field displays the number of configured cells in excess of the number of cell usage rights applied to the complex (purchased rights or borrowed from a GiCAP group). Therefore, this number represents the count of cells which are expected to be inactive.

Number of inactive cells:

This field displays the current number of inactive cells in the complex.

Amount of memory without usage rights:

This field displays the total amount of configured memory in excess of the amount of memory usage

rights applied to the complex (purchased rights or borrowed from a GiCAP group). This amount of memory is expected to be inactive.

Amount of inactive memory:

This field displays the current amount of inactive memory in the complex.

Number of cores without usage rights:

This field displays the number of configured cores in excess of the number of core usage rights applied to the complex (purchased rights or borrowed from a GiCAP group). This is the number of cores which are expected to be inactive. (If fewer cores are inactive than are expected to be inactive, the complex is either consuming temporary capacity or is out of compliance.)

Number of inactive cores:

This field displays the current number of inactive cores in the complex.

Number of cores using temporary capacity:

This field displays the number of cores presently consuming temporary capacity in the complex.

Number of cores that must be deactivated (insufficient usage rights):

This field displays the number of active cores in excess of the number of available usage rights on the complex. For the system to be in compliance, this number of cores must be deactivated.

Temporary capacity available:

This field displays the amount of temporary capacity available. This balance is displayed in days, hours, and minutes. This value does not reflect any possible use of pooled temporary capacity from a GiCAP group, if the system is a member of a group.

Projected temporary capacity expiration:

This field displays the date and time that temporary capacity is projected to expire at the present consumption rate. This value does not reflect any possible use of pooled temporary capacity from a GiCAP group, if the system is a member of a group.

Allocation of Instant Capacity Resources Among the nPartitions

The following table displays how Instant Capacity components are distributed among the partitions in the complex:

nPar ID:

This field displays the partition number for the row of data.

Total cores:

This field displays the total number of cores physically present for the hard partition. An asterisk will appear in this field if the Instant Capacity software makes an assumption when displaying this number. See the Instant Capacity User's Guide located at `/usr/share/doc/icapUserGuide.pdf` for more information on what these assumptions might be.

Intended Active cores:

This field displays the number of cores requested to be active for this hard partition; this is the number of cores that will be activated during a boot operation. Typically, this is the number that results from the execution of an `icapmodify` command. Other commands such as `parmodify` and `parcreate` can also affect this value. `vparmodify` does not affect this value.

Actual Active cores:

This field displays the current number of active cores for the hard partition. An asterisk will appear in this field if the Instant Capacity software makes an assumption when displaying this number. See the Instant Capacity User's Guide located at `/usr/share/doc/icapUserGuide.pdf` for more information on what these assumptions might be.

Inactive cores:

This field displays the current number of inactive cores in the hard partition.

Inactive Memory:

This field displays the current amount of inactive memory in the hard partition.

Inactive Cells:

This field displays the current number of inactive cells in the hard partition.

Runs iCAP:

This field indicates whether the hard partition contains compatible Instant Capacity software.

nPar Name:

This field displays the partition name corresponding to the row of information that is displayed. If the row is the local partition, the word "local" will follow the partition name. For cells that are not assigned to partitions, the "Unassigned Cells" label will be displayed.

Options

`icapstatus` recognizes these options:

- s Displays system snapshot information. This option displays the product and serial number for this system, as well as a snapshot string that can be entered into the HP Utility Pricing Solutions portal for periodic auditing purposes.

EXTERNAL INFLUENCES

Environment Variables

- `LANG` determines the locale to use for the locale categories when both `LC_ALL` and the corresponding environment variable (beginning with `LC_`) do not specify a locale. If `LANG` is not set or is set to the empty string, a default of "C" is used (see *lang* (5)).
- `LC_TIME` determines the date and time strings output.
- `LC_MESSAGES` determines the language in which messages (other than the date and time strings) are displayed.

If any internationalization variable contains an invalid setting, `icapstatus` behaves as if all internationalization variables are set to "C" (see *environ* (5)).

Instant Capacity HP-UX Manpages
icapstatus (1M) Manpage

RETURN VALUE

icapstatus exits with one of these values:

0	Command succeeded.
2	Command succeeded; system is not an Instant Capacity system.
$>0, !=2$	Command failed; error message sent to STDERR.

AUTHOR

icapstatus was developed by HP.

SEE ALSO

icapmodify (1M), *icapnotify (1M)*, *icapmanage (1M)*, *icapd (1M)*, *icap (5)*.

icapd (1M) Manpage

icapd (1M)

NAME

icapd – Instant Capacity (iCAP) daemon.

SYNOPSIS

icapd

DESCRIPTION

icapd (formerly **icodd**) is installed and started as part of the Instant Capacity software on all potential iCAP systems, and re-spawns itself if killed. Note that other Instant Capacity commands fail if this daemon is not running. The operations this daemon performs are vital in keeping the complex-wide view of the Instant Capacity state current. The following entry is added to **/etc/inittab** in order to have **icapd** start and re-spawn itself:

```
icap:23456:respawn:/usr/lbin/icapd # Instant Capacity daemon
```

This daemon is not started on hardware that is not supported under the Instant Capacity program. If **icapd** is installed and running on a system with Instant Capacity components present (cores, cells, or memory), it sends daily asset report e-mail to HP (if so configured), tracks temporary capacity, sends exception notifications, and maintains a healthy Instant Capacity state.

For more information about the functions that **icapd** performs for Instant Capacity systems, view the Instant Capacity User's Guide located at **/usr/share/doc/icapUserGuide.pdf**.

The **icapd** daemon reports errors via **syslog** (see **syslog (3C)**). Exception notification e-mail is sent to **root** and to the system contact e-mail address (configured via the **icapmodify** command (see **icapmodify (1M)**)).

The **icapd** daemon performs periodic operations based on the time of day. The **icapd** daemon is spawned by **init** and gets its timezone specification from the **/etc/default/tz** file. By default the timezone

specified in `/etc/default/tz` is EST5EDT. You can specify which timezone the `icapd` daemon uses to interpret its current time by modifying the `/etc/default/tz` file. Refer to *environ* (5) for details of the TZ format. A restart of the `icapd` daemon is required before the new timezone value takes effect (i.e., kill the `/usr/lbin/icapd` process).

AUTHOR

`icapd` was developed by HP.

SEE ALSO

icapmodify (1M), *icapstatus* (1M), *icapnotify* (1M), *icapmanage* (1M), *icap* (5).

D**Glossary**

Instant Capacity Terminology

The following terms are commonly used in conjunction with Instant Capacity:

activated core

A core that has been turned on by the Instant Capacity software or during installation. Cores are activated with the `icapmodify` command (or the `vparmmodify` command in an HP-UX virtual partition) while HP-UX or OpenVMS is running.

active cell

A cell that is available for use by the software running on the nPartition. This implies that the cell's processors and memory (and I/O, if the cell is attached to an I/O chassis) are all available for use by the operating system. An active cell has the following characteristics:

- It is present and populated.
- It is powered on.
- It is assigned to an nPartition.
- It is released from boot-is-blocked.

active nPartition

An nPartition is active if at least one of the cells in the nPartition is active.

add-on system

A system that has been converted to an Instant Capacity system. This process is performed by an HP service representative.

BCH

Boot console handler. The system firmware user interface that allows boot-related configuration changes and operations on PA-RISC systems. For example, BCH provides a way to specify boot options and the choice of boot devices. The EFI Boot Manager provides a similar function for Itanium-based systems.

BIB

Boot-is-blocked. The state of a cell that is powered on but is not allowed to boot.

bound core

For vPars versions before A.04, a core that can process interrupts for a virtual partition. Bound cores cannot be migrated from one virtual partition to another if either of the partitions is running. Every virtual partition must have at least one bound core.

cell

A circuit board that contains cores and memory, controlled by a cell controller chip. A cell board is the basic building block of an nPartition in a complex.

codeword

The mechanism used with Instant Capacity software B.06.x and later to manage component usage rights. Prior to activating a component, a Right to Use (RTU) codeword must be applied to an Instant Capacity system. Codewords are obtained from the Utility Pricing Solutions web portal after additional usage rights for an Instant Capacity component have been purchased.

configured processor

A processor that has been configured at the boot console handler (BCH) and whose core(s) are now available for activation.

Glossary

Instant Capacity Terminology

core

The actual data-processing core within a processor. There may be multiple cores within a single processor.

deactivated core

A core that either has not yet been activated or that has been turned off by the Instant Capacity software and returned to the pool of inactive cores. These cores are available for activation.

Note that new HP-UX or OpenVMS processes are not assigned to a deactivated core and all processes running on the deactivated core are migrated to other cores (with the exception that interrupt handlers may not be migrated from deactivated cores).

deconfigured processor

A processor that has not yet been configured at the boot console handler (BCH). The Instant Capacity software cannot activate a processor core that is deconfigured.

guest OS

A guest operating system is the operating system that is running on a virtual machine.

hard partition

A physical partition of an HP server, comprising a group of cells (containing processors and memory), and I/O chassis. Each hard partition operates independently of other hard partitions, and can run a single instance of HP-UX or some other operating system. A hard partition can be further divided into virtual partitions. Hard partitions are also referred to as “nPartitions”.

iCOD component

See **Instant Capacity component**.

iCOD processor

See **Instant Capacity processor**.

inactive cell

A cell that is not available for use by software running on an nPartition. This term is usually used to describe a cell that has the following status (though any cell that is not active is by definition inactive).

- The slot is present and is populated.
- Power is enabled.
- Boot-is-blocked.
- The cell is assigned to an nPartition.

inactive nPartition

An nPartition in which all of its cells are inactive.

inactive processor

A processor in an Instant Capacity system that is currently inactive. Inactive processors without usage rights are capable of activation by use of the `icapmodify` command (or by use of the `vparmmodify` command in a virtual partition). An inactive processor is also referred to as a “deactivated processor”.

Instant Access Capacity

Also called IAC. An amount of temporary capacity included with the purchase of an Instant Capacity component.

Instant Capacity (iCAP, iCOD)

Also called iCAP, and formerly known as Instant Capacity On Demand, or iCOD. The HP Utility Pricing Solutions product that allows you to purchase and install additional processing power through the use of a two-step purchase model. Initially, you purchase system components (processors, cell boards, memory) at a fraction of the regular price because the usage rights are not included. These Instant Capacity components are inactive but installed and ready for use. When extra capacity is needed, you pay the remainder of the regular price for the usage rights to activate the component(s). If the regular price for the

Instant Capacity Terminology

component is reduced by the time the usage rights are purchased, the remainder price is proportionally reduced, providing additional savings.

Instant Capacity component

Also called a component without usage rights, an Instant Capacity component is a core, cell board or memory that is physically installed in an Instant Capacity system but is not authorized for use. Before it can be used, an RTU (see **Right to Use**) must be purchased and a codeword applied to the system.

Instant Capacity processor

Also called a processor without usage rights, a processor that is physically installed in an Instant Capacity system, but does not have usage rights, nor is it activated. After obtaining usage rights, Instant Capacity processors can be turned on by the Instant Capacity software or during installation. Processors with usage rights are activated with the `icapmodify` command (or the `vparmmodify` command in a virtual partition) while HP-UX or OpenVMS is running.

migrating cores

The process of activating and deactivating cores across partitions for load-balancing. See “Load-Balancing Active Cores” on page 73 for more information.

monarch processor

This is the main controlling core from the perspective of the operating system. This core is designated as CPU 0. The LPMC monitor does not deactivate/replace a failing monarch processor. This is also known as the boot processor.

nPartition

A partition in a cell-based server that consists of one or more cells, and one or more I/O chassis. Each nPartition operates independently of other nPartitions and either runs a single instance of an operating system or is further divided into virtual partitions.

online activation

The ability to activate a deactivated core while HP-UX or OpenVMS is running. No reboot is required. This is done by using the `icapmodify` command, or the `vparmmodify` command in a virtual partition. Online activation is the default behavior of the Instant Capacity software.

partition

A subset of server hardware that includes core, memory, and I/O resources on which an operating system can be run. This type of partitioning allows a single server to run an operating system independently in each partition with isolation from other partitions.

Pay per use

Also called PPU. The HP software product, which is a part of the HP Utility Pricing Solutions program, that has a pricing model in which you are charged for the processing usage. You acquire a specific hardware platform, and number of cores, and are charged for usage of the cores depending on system demand.

processor

The hardware component that plugs into a processor socket. Processors can contain more than one core.

Right to Use (RTU)

The fee a customer pays to acquire usage rights for a complex with Instant Capacity components (memory, cell board, or core). This fee authorizes the user to obtain an RTU codeword to activate Instant Capacity components. The amount paid for this is called the “activation fee” or “enablement fee”.

system

A server, nPartition, virtual partition, or virtual machine that is running an instance of an operating system.

Glossary

Instant Capacity Terminology

temporary capacity (TiCAP, TiCOD)

Or Temporary Instant Capacity, an HP product that enables customers to purchase prepaid core activation rights, for a specified (temporary) period of time. Temporary capacity is sold in 30 processing-day increments. Temporary capacity is also referred to as “TiCAP” or, formerly, as “TiCOD”.

virtual machine

A software entity provided by HP Integrity Virtual Machines (Integrity VM). This technology allows a single server or nPartition to act as an Integrity VM Host for multiple individual virtual machines (also known as “VM Guests”), each running its own instance of an operating system (referred to as a “guest OS”). Each VM Guest emulates a real Integrity machine, including firmware. Virtual machines are servers in the Virtual Server Environment (VSE).

virtual partition

A software partition of a server, or of a single nPartition, where each virtual partition can run its own instance of an operating system. A virtual partition cannot span an nPartition boundary.

VM Host

An HP Integrity server running HP-UX with the HP Integrity Virtual Machines software installed. Virtual machines are manifested as processes executing on the VM Host. Configuration, management, and monitoring of virtual machines is performed on the VM Host.

vPars

An HP software product that allows software partitioning.

WBEM

Web-Based Enterprise Management. A set of web-based information services standards developed by the Distributed Management Task Force, Inc. A WBEM provider offers access to a resource. WBEM clients can send requests to providers to get information about and access to the registered resources.

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Instant Capacity Terminology

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